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LAND FILTRATION AREAS.
Much overgrown with vegetation, which is now being removed.

THE OPERATION OF SEWAGE DISPOSAL PLANTS

Sand Filters—Importance of Rest Periods and Drying of Surface—Plowing Beds—Operating in Winter—Broad Irrigation—Sub-Surface Irrigation—Choice of Site—Raising Crops.

By FRANCIS E. DANIELS.*

This is the sixth installment of a series of articles by Mr. Daniels. The others were as follows: January 15—Grit chambers and screens; regular frequent cleaning most important. February 19—Skimming, sedimentation and septic tanks; keeping daily records of operation; duplicate units; treatment of sludge and scum. March 19—Emscher tanks, principles of operation and design; baffles and scum boards; gas vents and scum; cleaning slopes and slots; drawing off sludge; sludge beds and sludge disposal. April 16—Contact and sprinkling filters—periods for each of the four phases; filtering medium and drainage; keeping surface open; automatic control apparatus; how to make putrescibility tests. May 21—Sprinkling filters, care of nozzles, settling basins; natural and artificial sand filters.

SAND FILTERS.

Sand filters are by no means "fool proof" and unless operated in a careful and intelligent manner they may become a source of nuisance and a total failure.

The successful management of sewage sand filters depends upon the fact that they must be operated strictly in accordance with the natural laws which underlie the process. In every case failure is traceable directly to the violation of one or more of the fundamental principles, and the plant attendants have almost invariably believed that the beds were for the sole purpose of straining out the suspended matter. Too often the term "intermittent" in its proper sense is entirely lost sight of. Since the process is one of oxidation it necessarily follows that

the doses must be applied in small quantities for *short* periods of time, and the beds allowed to drain and air between applications. The continuous application of sewage to sand beds for over 24 hours at a time will have serious effects upon the effluent, and will so injure the beds that a very abnormal length of time will be required for the beds to recuperate. No bed should be used longer than a day at a time and it would be much better in many cases to change the flow twice a day, especially in warm weather. When automatic dosing apparatus are used the successive charges should go upon separate beds in rotation, except perhaps in the case of small plants in which the bed will have time to drain and air before the next dose has accumulated. Even under such conditions it would, perhaps, be better to have a greater number of smaller units so that the dose would not be held so long to get foul before being applied to the sand.

It will not be necessary to go into a discussion of the chemistry and bacteriology of sand filters, as these subjects are taken up more or less in treatises upon sewage disposal. The attendant should, however, realize that important chemical changes must be produced in the organic substances passing through the beds. These changes will not occur in sterile beds nor in those in which the proper kinds of organisms have not been allowed to develop or thrive.

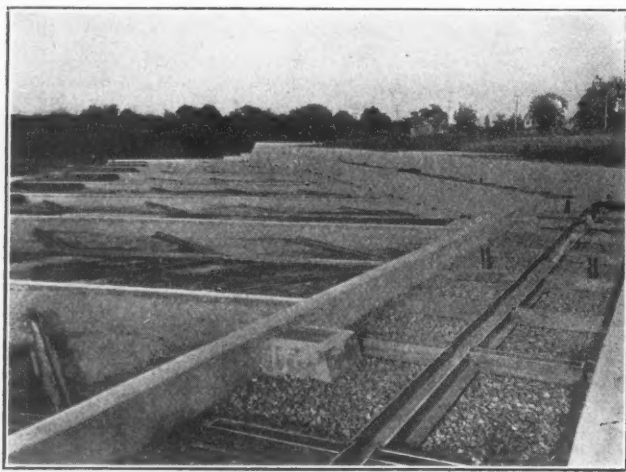
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The organic substances are oxidized, nitrogen appearing in the form of nitrites and nitrates, and carbon and hydrogen as carbon dioxide and water.

The organisms responsible for these changes are aerobic and belong to two groups; viz., *Nitrosomonas*, the nitrite formers, and *Nitrobacter*, the nitrate formers.

They are sensitive to their environment and if deprived of air or interfered with by anaerobic conditions their activities cease. It, therefore, becomes necessary for the attendant to see that the sand bed gets an even dose of sewage of short duration, and a sufficient period of rest before the next application, for the process is not merely one of straining out the suspended matter.

The writer once visited a sand filter plant, the beds of which received the effluent from a septic tank. The sewage was about a foot deep upon the beds, and in it was a considerable growth of algae and large numbers of mosquitoes in all stages of development. The effluent from the beds was perfectly clear and with almost no odor, yet the substances in solution had undergone no purification whatever. The liquids were highly putrescible, and when incubated over night they developed an odor which was extremely offensive.



SECONDARY SAND BEDS.

Considerable skill is necessary in managing beds having sluggish drainage. Under such circumstances the attendant must make the best of a bad bargain. He must arrange to give each bed the shortest dose consistent with the longest period of rest, bearing in mind that it will not do to dose the bed for several days, although a longer rest is to be provided. Neither is it proper to rotate so often that all of the beds are wet practically all of the time.

The bed must dry, especially on the surface, at frequent intervals, and preferably between applications. Unless this is done very objectionable growths of fungi, blue-green algae, or green algae are bound to occur. These growths cause undue clogging of the surface of the sand, hinder the drying of the bed, and add considerably to the cost of cleaning. Preventive measures are by far more advisable than curative. Although these growths cannot exist on dry surfaces, it sometimes becomes advisable to kill them out as they begin to form. Chloride of lime is useful in destroying fungi, and copper sulphate has been used to keep down growths of algae on some of our sewage beds.

From the foregoing will be seen the necessity for tight valves and gates, and the attendant should be sure that the flow is completely cut off when a valve or gate admitting the dose is closed.

Sand beds should be kept continually free from weeds

and vegetation, as such things "constitute a perpetual plague." It is not unusual to see a neglected bed covered with a crop of tomato plants grown from seeds deposited by the sewage.

No set rule for cleaning sewage beds can be laid down, but the accumulations must be scraped up and removed as soon as they become sufficient to interfere in any way with the proper working of the beds. Nothing should be allowed to retard the entrance of the water into the sand. Under normal conditions the layer of deposits cracks and curls as it dries, so that it can be removed easily without taking up much sand. When large areas of natural soil are employed it is usually only necessary to plow and harrow the ground at frequent intervals. In these cases it is often well to have a flat clean area, over which the sewage may flow before reaching the beds, and upon which the solids may be deposited to be scraped up and removed, unless the sewage has previously passed through a settling tank.

Some soils are improved by plowing in sewage humus, but in most cases precautions should always be taken to prevent as far as possible the working of sewage humus down into sand beds.

It is necessary that the sand or soil be kept in a loosened up condition to enable the sewage to pass through rapidly and a sufficient quantity of air to penetrate as deeply as possible. This is an important point and one which is often overlooked. A plow, harrow, or cultivator may be used, depending on the nature of the bed; but if the bed is to be cleaned before the next plowing, the surface should be left as smooth as possible to facilitate cleaning without removing much sand.

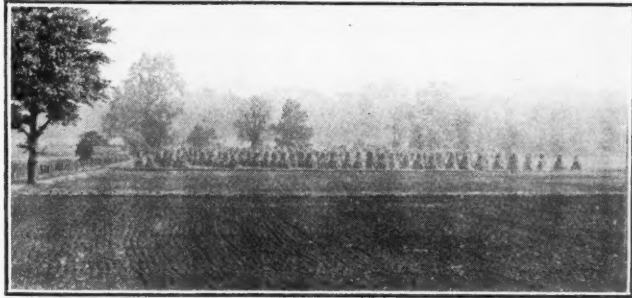
The winter management of sand beds in cold climates requires judgment and forethought on the part of the attendant. In New Jersey the winters are usually not severe enough to be troublesome. For one or two years some of our northern beds were operated by the Brockton method of furrowing them so as to have ridges to support the ice which formed. The beds could then be worked in the furrows under the ice. At the beginning of a cold snap the bed is flooded so that the sand does not freeze, and after the ice has formed it affords protection. For the last three or four winters the furrowing has been dispensed with, the temperature of the sewage and proper management being sufficient to keep the beds open. When the beds are not ridged in cold weather, care must be taken to prevent the sand from freezing to such a depth that the next dose of sewage will not thaw it out; and also, should a layer of ice form, this must not be let down upon the surface of a flat bed and allowed to freeze fast, or else the bed will go out of business until warm weather. One of our plant attendants let his filters freeze up this winter, which put them out of commission for some time. This would have been prevented by the application of sewage at the proper time.

The Worcester method of scraping the surface into little piles on the beds when cleaning in the autumn has merit in that the top of the bed is left flat while the piles form a support for the ice, and the cost for the subsequent cleaning is less than that of furrowed beds.

The winter operation must be somewhat different from that in summer. Higher rates often have to be employed and longer rests given to the beds. Consequently, under those conditions the effluents are not likely to be as good as in summer; yet with sufficient area and proper management very good results can be obtained in cold weather. During cold weather large doses should be applied suddenly in order to thaw out the frost, for a slow discharge is likely to freeze as soon as it spreads itself. In some cases it will be well to cut off the distribution

system, and direct the flow under the ice in a sufficiently large stream to prevent freezing. In very cold weather it is well to use only a few beds, adding others whenever a sufficiently warm spell occurs, and resting some which have been hard worked. In regard to these points much will depend upon the attendant's knowledge of the local weather conditions, his foresight, and good judgment.

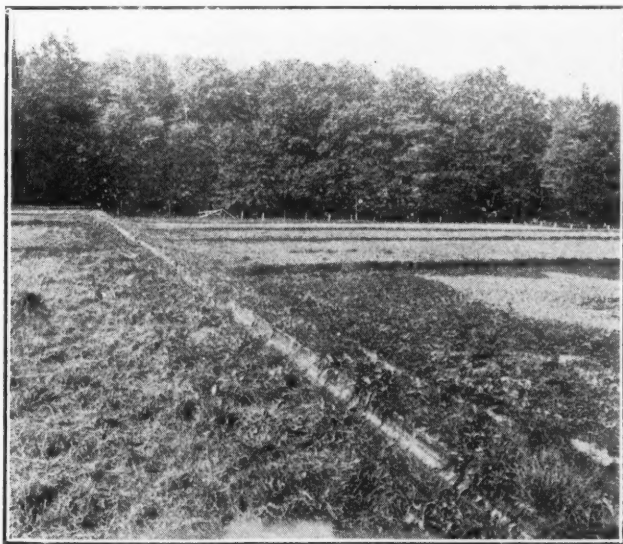
The writer has had several opportunities of demonstrating the advisability of plowing up and removing vegetation from areas set off for sewage disposal purposes. In one instance the beds were composed of stiff soil and



LAND FILTRATION AREA, RECEIVING RAW SEWAGE. Kept plowed and free from vegetation—Corn is sometimes raised on idle beds.

clay. In order to increase the drainage, large ditches had been opened up over the underdrains, and filled with cinders and porous material. The plant was then allowed to take its course, with the result that the beds became flooded, and overflowed. What went through the underdrains was clear, but highly putrescible. A considerable amount of grass and weeds had grown on the beds, and mosquitoes were abundant. The effluent ditch was in a very bad condition, and showed evidences of serious pollution. This is the condition the writer found at his first visit. It was very difficult to get the attendant to plow up the beds because he said it would make matters worse. The authorities were finally induced to plow and harrow the beds frequently, to alternate the doses, and to provide for better distribution. Good results were immediately produced. The ditch cleared up, the effluent became non-putrescible, and the mosquito-breeding place disappeared.

At another place, after much effort, the attendant was induced to plow up his sewage beds, which consisted of



A NEGLECTED SEWAGE PLANT. After plowing up the beds and removing the vegetation the effluent improved in a few days.

soil and more or less disintegrated red shale rock. The first plowing was quite difficult and was not completely done, but improvements were so apparent that the attendant volunteered to repeat the plowing later on. Now the beds are plowed and harrowed regularly, and are producing an excellent effluent.

Another plant is now under observation, where for years sewage has flowed over the vegetation upon the upper portions, and has formed ponds upon the lower parts. The removal of grass and a thorough plowing was advised. Tests of the scheme were made last summer by the owners of the plant, and as a result the plan is to be adopted for the whole plant this year.

LAND TREATMENT.

The disposal of sewage on land, sometimes known as Broad Irrigation or Sewage Farming, is, perhaps, the oldest method of sewage treatment. It is probable that in China and Japan human excreta have been utilized on land for thousands of years, while as early as 1559 a sewage irrigation area was established in Prussia. Later on considerable attention was given to sewage farming in England, and afterwards irrigation areas were established in many places on the Continent. In 1876 the first area for the city of Berlin was put in operation, to which other areas have been added, until the farms now are the largest in the world and cover nearly 50,000 acres of ground.

The objections in regard to area required for the process of intermittent sand filtration apply with more force in the case of broad irrigation, for the reason that a much larger area is required for the treatment of a given



BROAD IRRIGATION.

quantity of sewage by the latter method than by the former. Usually only about 10,000 gallons per acre per day can be successfully treated upon a broad irrigation area, while ten times that amount can be taken care of upon a good sand bed. Unless carefully managed, the process is likely to be objectionable if near built-up communities on account of odors, flies and unsightliness. However, 4,000 people actually reside on and take care of the sewage farms of Berlin, and considerable quantities of forage, cereals, and vegetables are raised. Even fish are raised in some of the ponds and drains, and are made to yield a revenue. In some other localities good crops have been raised, notably in California, but take it all in all, sewage farming is not a paying operation, and it is rapidly going out of favor, except, perhaps, in very dry regions.

There are only two sewage plants in the state of New Jersey which may be called broad irrigation plants, and upon these only a limited amount of hay is cut. The sewage is run out into furrows or ditches and very little systematic attention is given to the areas.

A low or marshy area should never be selected to receive sewage, because under such conditions there is danger of a nuisance without a purification of the sewage. Light, sandy or loamy soils with free drainage are the most suitable, while stiff clay is almost worthless.

The areas should be laid out with some system, so as

to dispose of the water to the best advantage. If crops are raised, good judgment must be used in the selection of the kinds which will be the most suitable under each particular local condition. The attendant must know just how much water each crop can stand, and to preserve the proper balance between the raising of crops and the disposal of the water often requires considerable skill and experience. Usually in wet weather, when the crops need the least added water, the sewage flow is the greatest; hence its disposal at such seasons is more difficult.

Grease and the larger suspended matters should be excluded, as these often seriously interfere with the growth of certain crops. The furrows or ditches should be laid so that the sewage is distributed evenly over the area, and in such directions that the ground is not washed in gullies in time of showers. The flow should be frequently changed from one area to another to prevent any part of the field from getting "sewage sick."

Corn and forage crops are raised and sometimes fruits and vegetables, but there is quite a sentiment against the growing of crops for human consumption upon sewage farms. Certainly berries, salad greens, celery, and low growing fruits and vegetables, which are eaten raw, should not be raised.

Although somewhat apart from the subject, it may be well to mention that extended sewage areas often have a direct effect upon neighboring wells. Such wells should be frequently examined, and in the location of new works the wells in the vicinity should be considered. English researches "have shown that specific bacteria may pass for a distance of two miles in less than three days through chalky soil of a porous nature."

SUB-SURFACE IRRIGATION.

For small estates and institutions a system of ramifying lines of open-jointed tile pipes, laid from one to two feet under the surface of a porous soil, provide a very suitable method of disposal of the liquid wastes. As much grease and suspended solids as possible should be retained in cesspools or tanks. The overflowing liquids should be discharged into the pipes and allowed to soak away. The discharge should be intermittent, preferably by means of a dosing tank and siphon. The total area should be laid out in units so that the doses can be diverted from one to another in rotation at intervals of a few days. When an automatic dosing apparatus has not been installed, the attendant must change the flow by hand at frequent intervals.

Such a system should never be placed in a low or marshy piece of ground. The writer once visited such a plant, taking sewage from an institution. The sewage and ground water had completely saturated the land and had risen above the ground in a pond of stagnant filthy mass of sewage. The plant had to be abandoned. A dry, free draining location, with porous soil, should be selected and great care should be used in laying the laterals, or else there will not be even distribution. Some ingenious terra cotta connections have been made for joining laterals to main distributors so as to enable equal portions of the dose to flow into each lateral. There should not be any trees nearby, as the tiles will become completely stopped up with roots. As bacterial action is best near the surface of the soil, it follows that the pipes should not be deeper than necessary to place them beyond disturbance and severe frost.

There is one comparatively large installation of this type in the state of New Jersey which takes care of the entire sewage from a county institution. In addition, there are quite a number of smaller sub-soil irrigation plants for private estates and residences, and those located in suitable ground are giving satisfaction, with comparatively little attention.

IMHOFF TANKS

Designing and Operating—Determining Capacity of the Several Parts—Details of Design—Operating Tank and Handling Sludge.

In a paper before the League of California Municipalities, Charles G. Hyde, Professor of Sanitary Engineering in the University of California, treated at some length the constructing and operating of Imhoff tanks. The part of this paper dealing with the former we abstract and the latter part we quote in full.

The "flowing-through" period for domestic sewages should never be less than, say, from 1 to 1½ hours. Evidence goes to show that the weaker sewages require as long, if not longer, periods of subsidence than do the stronger. The subsidence or retention period, based on the total displacement volume of the "flowing-through" chambers in any installation, should not be less than, say, from 2 to 4 hours, varying with conditions, for the average rate of flow of sewage from a population estimated for a reasonable period in advance of the time of construction.

It is probable that a minimum period of two months is required for the complete digestion of sludge under optimum conditions and that the total effective storage capacity of sludge digestion chambers should never be less than four months under California conditions in large plants. The smaller the plant the longer the period of sludge storage which may well be provided because of the greater variability which is likely to obtain with respect to the character and condition of the sludge and because of the desirability of reducing to a minimum the attendance required to be given to the withdrawal and drying of sludge, etc.

The volume of thoroughly digested sludge (75 per cent moisture), from a system of sanitary sewers (street wastes and storm waters being, of course, excluded therefrom), is given by Dr. Imhoff as 0.1 litre per day per person connected with the system. This is equivalent to 0.0035 cu. ft. per person or 3.5 cu. ft. per 1,000 persons per day.

Kenneth Allen has derived the following rough general formulae for the determination of the effective capacity of the sludge chambers of an Imhoff tank installation:

$$C \text{ (sanitary sewers alone)} = 5.25 P, D.$$

$$C \text{ (combined sewers)} = 10.50 P, D.$$

where

C = effective capacity of chambers in cubic feet;

P = population in thousands provided for; and D = duration of storage of sludge or the retention in days.

By the term "effective capacity" of sludge digesting chambers should be meant the volume measured from the bottom up to a point such a distance below the bottoms of the slots of the "flowing-through" chambers that no gas-laden sludge may be carried backward through the slots. This level is ordinarily from 18 to 24 inches below the slots.

Circular tanks are favorable from the standpoint of their capacity for resisting earth pressure but they involve heavy additional expense for form work as compared with rectangular tanks. In some cases the expense so represented is greater than that which would be represented by the additional concrete and reinforcement possibly required for the rectangular tanks.

The greater the depth the smaller the volume of digested sludge will be, due to the greater compression of the entrained gases (resulting from the decomposition of sludge) and due to the smaller water content or percentage of moisture. The greater the width of sedimentation chambers the greater their depth must neces-

sarily be and the greater will be the volume of ineffectual space in the scum chambers above the level of the slots. The use of multiple sedimentation chambers may often permit of their better proportioning and greater effectiveness.

General experience derived in the subsidence of sewage and of water indicates that the average rate of forward motion should not as a rule be greater than from 50 to 75 feet per hour. In Germany, in the sedimentation chambers of Imhoff tanks, the average nominal velocity is stated to be not usually less than 60 feet per hour.

The bottom slopes of the sedimentation chamber should be not less than, say, 1.25 on 1.0. It is probably seldom desirable to increase these slopes beyond 1.5 on 1.0. The interior surfaces of these chambers should be very smooth.

For the width of slots in the bottoms of sedimentation chambers through which the sludge may pass to the digestion chambers, from 6 to 8 inches would represent good design for large chambers, while even 4 inches may be found satisfactory for small works where sewage is screened or otherwise free from the danger of conveying extremely coarse matters. The overlapping of the edges of the bottom slopes of the sedimentation chamber, measured horizontally, should never be less than 3 or 4 inches. A safer figure would be 6 inches. The bottom slopes of sludge digesting chambers may be comparatively slight. A slope of 1 on 2 would appear to be ample and under certain conditions an even smaller slope may be desirable.

Sludge removal pipes are seldom less than 8 inches in diameter nor more than 10 inches. In very small and shallow installations 6-inch or even 4-inch pipes may be employed with satisfaction. Sludge removal pipes should be enlarged, if possible, by some sort of bell end at their lower extremities. They should be set with their lower ends from 8 inches to one foot above the bottom and they should be rigidly supported. The outlet ends of these pipes should be placed with reference to the normal water level in tanks so that the static head will be from 3 to 6 feet, depending on conditions. The pipes should, in all cases, be heavily coated with materials which will resist the action of the gases and decomposing products in the sludge digesting chambers.

The scum chambers should be perfectly accessible so that the scum may be frequently broken up with a view to liberate the entrained gases and permit the solids to settle to the bottom where proper digestion may take place. If this is not done very troublesome amounts of scum may be formed and, under extreme conditions, practically the entire weight of solids deposited in a tank will be lifted into the scum chambers and will collect to a depth which will be limited only by the dimensions of the tank.

The size of sludge drying beds is governed largely by conditions of atmospheric dryness and of temperature, because they determine, to a considerable degree, the rapidity of the drying out of the sludge. Sludge from deep tanks, because of the usually smaller water content and the greater compression and hence the great volume of entrained gas, will require less area in drying beds than will the sludge from shallow tanks of similar capacity.

The usual rule for determining the size of sludge drying beds in Germany in connection with Imhoff tank installations serving sanitary sewers only is to provide about 330 square feet per thousand persons represented by the tank capacity. In America this figure may be accepted provisionally for tanks of the usual depth and

under average climatic conditions. Covers over the sedimentation, scum and sludge digestion chambers are to be avoided, inasmuch as they are entirely unnecessary to the proper physical and biological action of the tanks and are a decided obstruction and hindrance to their proper manipulation.

Dr. Imhoff's royalty charge represented by a single payment when the construction of works is begun, varies with the population which the installation is proportioned to serve and is believed to be approximately as follows:

Minimum charge	= \$	25
For 1,000 persons	=	80
" 2,000 "	=	140+
" 3,000 "	=	180
" 4,000 "	=	200+
" 5,000 "	=	225
" 10,000 "	=	400
" 100,000 "	=	2,500

OPERATING IMHOFF TANKS.

The following schedule of operations is tentatively suggested as essential to the satisfactory and effective working of Imhoff tank installations. This program is based upon general as well as local experience; but it is to be realized that experience in America is to date very meagre and further experience may show that other features of manipulation may require to be taken into account. However, it is believed that, if the following procedure is consistently carried out, the results will be generally satisfactory.

(1) *Cleaning Sides and Slots of Sedimentation Chambers.*—Every few days the walls and sloping bottoms of sedimentation chambers should be gone over with a rubber squeegee (a flat hardwood board from 12 to 24 inches long and from 3 to 4 inches wide with rubber edges and a light wooden handle of length determined by the dimensions of the chambers) and all adhering solid matters pushed down through the slots. Floating materials, such as matches, corks, etc., behind baffles and all scum collecting upon the surface of sewage passing through the chambers should be removed. This may be done by means of a dish-shaped perforated skimmer, perhaps 18 to 20 inches in diameter, attached to a long wooden handle. The scum and floating material may be thrown into the scum chambers connecting with the digestion chambers. No decomposing material should be allowed to accumulate in these chambers, otherwise septic action may take place and disagreeable odors produced.

(2) *Reversal of Flow.*—In installations where two or more tanks are operated in tandem the flow should be reversed in direction through the tanks at least once a month. This is necessary or at any rate very desirable in order that the sludge collecting in the several tanks may be maintained as nearly as possible uniform in composition and volume.

(3) *Breaking Up and Removal of Scum in Scum Chambers.*—Every few days, depending upon the character and composition of the scum, the rapidity with which it is formed, etc., the scum collecting in the scum chambers should be thoroughly broken up with a rake or other suitable device and pushed down into the digestion chambers. If this is not faithfully and consistently done at sufficiently frequent intervals scum may collect to altogether too excessive depths in the scum chambers. Great depths of scum will not digest properly and may give off more or less offensive odors of decomposition. If, in spite of frequent and thorough agitation, the scum layers become too deep, dense and hard and cannot be made to deposit in the digestion chambers, they should be removed by means of shovels. This scum may be taken to a sludge drying bed and there dried out and

mixed with the digested sludge from the lower chambers.

(4) *Observation of Rate of Deposition of Sludge.*—The rate of deposition of the sludge in the sludge digestion chambers should be carefully watched and the elevation of its surface should be determined as frequently as once in each week or 10 days. This may be done by means of a weighted board or sheet iron plate from 12 to 18 inches square attached to a wire or cord or to a long light rod of wood or gas pipe.

(5) *Removal of Sludge.*—When the surface of the sludge has risen to a point 18 or 20 inches below the slots, some of the thoroughly digested sludge at the very bottom of the tank should be drawn off. The amount withdrawn at any one time should not be too great. In the first place only well digested sludge should be removed. Again, it is better, at least in large plants, to remove relatively small amounts of sludge at frequent intervals than to withdraw very large quantities infrequently. If the entire volume of sludge were removed at any one time, the entire process of ripening or establishing effective biological action in the lower chamber would require repetition. This ripening period is sometimes marked by very excessive and troublesome scum formation. Great care must be taken not to allow the sludge to pass too rapidly out through the sludge withdrawal pipes because the less well digested and softer sludge nearer the surface might be forced by the water pressure out of the tank rather than the more compact, thoroughly digested and less readily flowing sludge at the bottom. In other words, an inverted cone of least resistance might be formed and eventually only liquid, rather than solids, would pass from the tank.

(6) *Use of Perforated Pressure Pipes.*—If the sludge should not flow readily through any sludge removal pipe it may be loosened by forcing clarified sewage or water through the perforated pressure pipe in the bottom of the digestion chamber. If clarified sewage is employed it will require to be pumped by a hand or motor-driven pump whose suction should be guarded by a brass screen having at least 10 meshes per linear inch, so that the perforations in the pipe may not become clogged. According to Saville, excessive scum formation may sometimes be checked by the occasional use of this perforated pipe. When this is done some of the gas in the sludge is driven off and there is consequently less tendency for it to rise into the scum chambers. Furthermore, if the activity of the organisms in the sludge seems to be retarded, due to the excessive formation of so-called enzymes or other by-products of their existence, these may be disseminated and diluted by spraying fresh clarified sewage or water through the perforated pipes in question.

(7) *Refilling of Sludge Pipes.*—After each withdrawal of sludge the sludge pipe should be backfilled with water or clarified sewage. If the latter is employed it may be pumped into the pipe by means of the force pump mentioned in (6). If the pipe were not thus backfilled it would almost certainly become clogged with dried-out sludge. If, from any cause, the sludge pipe should become clogged it may be cleaned by pushing a rod through it or by forcing water or clarified sewage through it under sufficient pressure. In order that these methods of cleaning may be utilized the straight run of the pipe should be continued to a point slightly above the high water line in the tank. This portion of the pipe may be capped, if desired, the cap being fitted with a pump connection.

(8) *Drying of Sludge.*—The depth of sludge deposited upon the drying bed at any one time should not be over 12 or 15 inches. In dry weather the sludge should be-

come spadeable in a few days and should be removed from the bed. It may be used as a fertilizer upon lands or it may be used for filling in low places upon which it is not anticipated that houses will ever be built. German experience indicates that such material is a fairly satisfactory fertilizer and is well worth hauling away and utilizing upon cultivated lands. It has the advantage of being able to lighten heavy soils and it would doubtless furnish humus to soils which are lacking in this feature. When deposited in fills the thoroughly digested sludge does not undergo putrefaction and will not cause any nuisance due to odors.

(9) *Re-surfacing of Sludge Drying Bed.*—Whenever the surface layer of the sludge drying bed becomes clogged or is taken away in the removal of the sludge a new layer should be applied. This feature is important in order that water draining from the sludge may be removed quickly either by seepage into the underdrainage system or into the naturally porous sub-surface materials, as the case may be.

(10) *Sampling and Testing of Sewage.*—The superintendent of sewers or other official in charge of the sewage treatment and disposal works should be provided with Imhoff conical glass graduates for testing the amount of suspended matter in the raw and settled sewage. From these observations the efficiency of any installation may be roughly determined. The results should be recorded on proper blanks prepared for the purpose. Ordinarily this testing should be done once a day, but occasionally it should be done throughout the day, in order to determine the variations in the composition of the sewage.

(11) *Measurement of Sewage.*—Every installation should be provided with a measuring weir, suitable orifices or other devices for determining with reasonable accuracy the rate of flow of sewage. Whenever possible a recording, self-integrating gauge should be installed to exhibit the flow of sewage at all times. This gauge should be systematically checked against a suitable glass gauge and scale, or, better, against a hook gauge.

PASADENA'S SEWAGE FARM.

We have described and several times referred to the sewage farm of Pasadena, Cal., one of the most interesting and perhaps the most successful (from a financial point of view, at least) in this country. The report for 1913 of the city auditor gives the following information concerning it:

The original city farm consisted of 300 acres and was purchased in 1888. In 1903 160 more acres were purchased. Since that time small lots have been bought until now the farm consists of 530 acres. When purchased, the farm was intended for sewage disposal, but later the question arose as to how to secure some revenue and also make the farm less offensive. The city trustees at that time started experimenting with alfalfa and planting walnuts. The walnuts have been quite satisfactory, but discharging the sewage on the alfalfa was a failure, so the products of the farm were confined to growing walnuts, hay and corn until about three years ago a septic tank was built which takes care of the sludge, and now we find that growing alfalfa with sewage irrigation is quite profitable and not at all offensive. We have now 111 acres growing, 66½ acres having been planted this year. We have also harvested 109 acres of oat hay, 50 acres of corn and 106 acres of walnuts are now growing, and there are 70 acres of young orange and lemon orchards, two and three years old, all of which are irrigated by sewage. We have laid about 4,500 feet of cement pipe for distributing sewage, and we find it can be controlled and better results obtained than when running in open ditches. There are a few acres of nursery, making in all about 450 acres under cultivation.

We have recently built an Imhoff tank, which we hope

may solve the problem of foul smelling water from sewage. Although it has not been in use long enough to note results, we expect a great improvement over the old methods, in fact this has been shown already. We cannot give correct reports on the year's returns, as the walnuts have not been harvested, but the prospects look good.

VITRIFIED SEGMENT BLOCK SEWERS

Experiences With this Construction in Brooklyn, N. Y., Torrington, Conn., and Louisville, Ky.—Methods of Construction and Costs.

IN BROOKLYN, N. Y.

By E. J. FORT, Chief Engineer, Bureau of Sewers.

Brooklyn has recently completed a storm sewer 42 inches in diameter and 810 feet in length in which vitrified segmental blocks manufactured by the American Sewer Pipe Co. were used with very satisfactory results. I have been particularly interested in this sewer and in this method of sewer construction because the details of the design of such blocks and the probability that they would be able to compete successfully with other materials of construction were thoroughly discussed in this office some time before they were placed on the market.

The standard type of construction in Brooklyn for sewers from 30 to 60 inches in diameter (for which sizes I consider these blocks particularly adapted) has been for many years an 8-inch ring of brickwork. In firm soil no haunch walls or foundation of any kind has been used except at manholes.

I have found that in sandy soil where the diameters exceed 60 inches it is very difficult to avoid cracks at the extremities of the vertical and horizontal diameters after the backfilling is placed and the sheeting has been withdrawn without the use of some form of haunch wall or foundation other than the 8-inch ring of brickwork; so I think the question may fairly be raised as to whether, in the very large sizes of sewers for which the use of segment blocks is urged, additional masonry should not be used in the foundation unless the soil is of such a character that it can be shaped to fit the outside surface of the blocks and will stand firmly in place until they are laid in place.

In this particular contract the contractor was given the privilege of selecting any one of three materials—brick, reinforced concrete pipe or vitrified blocks.

The depth of excavation was approximately 12 feet. The soil was almost pure sand and required close sheeting throughout.

A 12-inch sanitary sewer was built in the same trench by the side of the storm sewer and as close to it as it was practicable to place it. The horizontal distance from center to center of these two sewers was 4½ feet. The sanitary sewer was approximately five feet lower than the storm sewer and care was necessary to prevent settlements. The backfilling over the sanitary sewer was carefully placed and compacted and a line of short sheeting which was driven between the two sewers was left in place to prevent settlement of the high level sewer. The relative positions of the two sewers are shown in the accompanying sketch.

The short sheeting left in place extended down from the spring line of the storm sewer to the invert of the sanitary sewer. The sheeting at the sides of the trench was never allowed to extend below the spring line of either sewer and was withdrawn as the work progressed.

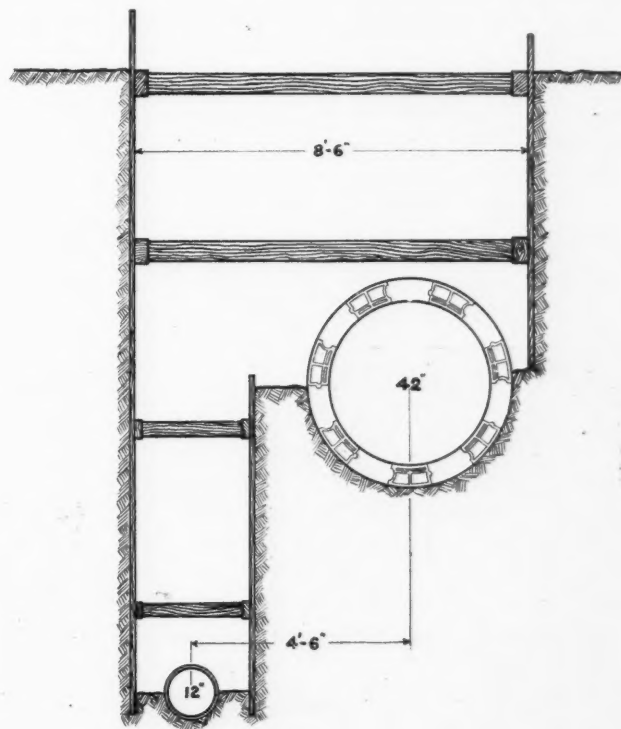
The blocks used were what are known in the manu-

facturer's catalogue as "Type C" blocks. These blocks were very true to form and in quality were equal to high grade vitrified pipe; occasionally one was found too badly warped for use, but the great majority of them were warped so little that there were no offsets at the joints and the thickness of the mortar joints was not greater than ½ inch or ⅜ inch.

The method of laying was the usual one. After the bottom of the trench had been excavated accurately to grade, a line of invert blocks was laid, each block being set carefully to grade by a measuring pole in the hands of the inspector, who measured from the grade line down to the invert grade of the sewer. After the invert blocks were laid, a profile was set at each end of the portion under construction. These profiles were usually about 20 feet apart; and each subsequent line of blocks was set by line, as in the case of brickwork, until the spring line was reached. The earth behind each line of blocks was carefully tamped with a brick in the hands of the block layer as each block was laid.

The form for the arch of the sewer, the construction of which is plainly shown in the accompanying photograph, was then set and the operation of laying the blocks was continued until the circle was completed at the crown.

A portion of this sewer was laid on the arc of a circle with a radius of 30 feet. Even here the joints were smooth and even, the play in the joints being sufficient



TYPICAL CROSS-SECTION OF TRENCH FOR STORM AND SANITARY SEWERS.

Kings Highway, between 15th and 16th streets, Brooklyn, N. Y.

to permit of adjusting each block to its neighbors so that there were no appreciable offsets between them.

Particular care was exercised in compacting the backfilling about the sides and haunches and over the crown so that the blocks would not move under the weight of backfilling. The block layer employed was a skilled laborer whose wages were \$2 per day. Two helpers whose wages were \$1.50 and \$1.70 per day prepared and delivered the mortar and the blocks to him and rendered whatever other assistance was necessary.

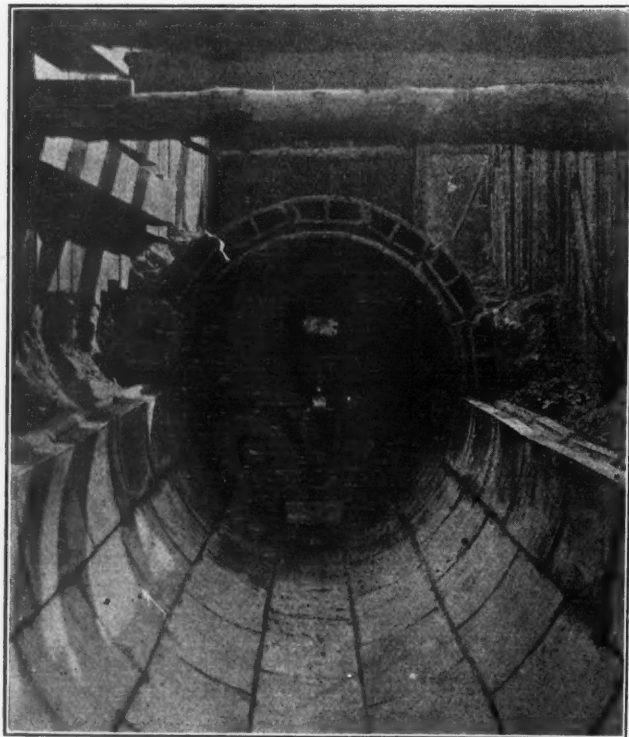
This labor cost was carefully compared with the labor cost of laying a brick sewer of the same size under similar conditions. The latter is on the average 60 per cent greater than the cost of laying a vitrified block sewer. The wages of bricklayers employed on this class of work was \$7 per day of 8 hours. The wages of bricklayers' helpers is \$1.50 to \$1.70 per day.

The actual cost of laying the block sewer and backfilling to a point 12 or 14 inches above the spring line was 45 cents per lineal foot; whereas the cost of laying a brick sewer of this size is usually sublet by the contractor to the bricklayer for 42 cents per foot. The cost of attendance increased this to 67 cents per foot. I am not able to state the cost of the blocks to the contractor. They were delivered along the line of trench by the manufacturer and piled ready for use. There was practically no waste, as no blocks were chipped, cracked or spoiled in any way.

The question as to whether the use of reinforced concrete pipe manufactured near the site of the work is more economical than this form of construction depends usually upon freight rates; but in this case at least, where sand of suitable quality was found in the sewer trench and could be obtained almost anywhere in the neighborhood and where the leading manufacturers of such pipe in the country competed for the job, blocks were chosen by the contractor as the cheapest form of construction.

The advantages of this type of construction, as they appear to me, are as follows:

1. It produces a sewer, the inside surface of which is nearly as smooth as that of a vitrified pipe. The coefficient of friction is considerably smaller than that of brickwork. It should not be greater than .011 if the work is carefully done. It will undoubtedly, therefore, produce a cleaner and more sanitary sewer.
2. The material of which the blocks are made is more durable than the average brick masonry used in sewers and this form of construction should, therefore, be more permanent.



INVERT AND END VIEW OF ARCH, KINGS HIGHWAY SEWER.

3. Such details as spurs for connections, joints, etc., have been properly worked out so that when the work of laying is properly done sewers built of these blocks should be less liable to leak than ordinary masonry. It has also been demonstrated that if it becomes necessary to make openings for connections where no spurs have been built in, this can be done by the ordinary plumber without danger of cracking or otherwise injuring the blocks.

4. It does not require the service of high-priced mechanics such as bricklayers.

Altogether my experience with the first trial of these blocks has been so favorable that the standard sewer specification in Brooklyn has been altered so as to permit of their use in all combined or storm sewers and in all sanitary sewers laid above the level of ground water in sizes between 30 inches and 60 inches inclusive.

They are not to be used in diameters less than 30 inches, because pipe is considered desirable for such sizes.

They are not to be used in sanitary sewers below the level of ground water because it is thought that by the use of vitrified pipe there is greater assurance that leaks can be eliminated.

IN LOUISVILLE, KY.

By ROY W. BURKS, First Assistant City Engineer.

During the year 1913 the city of Louisville constructed two sewers of vitrified clay segment blocks of a total length of 4,100 feet and ranging from 30 inches to 69 inches in diameter.

Before including this type of construction in our specifications or allowing alternate bids on same, the question of their practicability, cost, etc., was taken up by correspondence with some of the municipalities which had installed or were installing this type of sewer.

The letters received from all of the cities corresponded with recommended them very highly and these recommendations together with a trip to a northern city to inspect a 60-inch segment block sewer under construction, convinced the Board of Public Works that a first-class sewer could, under proper conditions, be constructed with the blocks.

The first pieces of work in which bids were allowed on segment block were on what are known as Section 2, 32d street sewer, a 50-inch sewer 2,500 feet in length, and Section 1, 23d street sewer, a 57, 60, 63, 66 and 69-inch sewer, about 2,600 feet in length. Alternate bids were called for in both cases on monolithic concrete (Type B), concrete pipe (Type C) and segment blocks (Type D). Vitrified pipe (Type A) was specified up to and including 24 inches diameter and alternate bids on the other types called for above 24 inches. On both of these contracts low bids were submitted on segment blocks. In order to give both the segment block and the concrete pipe sewers a trial, the Board of Public Works awarded to James Ferry & Sons, of Pittsburgh, contract for lock joint concrete pipe on Section 2, 32d street sewer, and for segment blocks on Section 1, 23d street sewer. The other sewer constructed of vitrified segment blocks is what is known as Section 3, 32d street sewer, 1,500 feet in length and 30, 33 and 36 inches in diameter.

The maximum cut in Section 1, 23d street sewer, was approximately 28 feet while the maximum cut in Section 3, 32d street sewer, was 17 feet. In both cases the excavated material was a good grade of sand and it was found necessary to drive sheathing to the invert grade of the sewer. The sheathing thus driven was afterward cut off above the springing line of the sewer and left imbedded in the backfill.

Templets similar to those used in the construction of brick sewers were set to grade and line and the bottom or invert blocks laid and kept well in advance of the remainder of the sewer invert. Great care was taken to see that the filling behind each invert block was properly done as the work on this portion of the sewer progressed. After completing the invert to the springing line, the arch was constructed by the use of a collapsible center furnished by the block manufacturer. In no case was trouble experienced in the construction of the lower half of the sewer, but occasionally the block setter would have some difficulty in setting his key block. In most cases, however, this trouble can be eliminated by adjustment of the center.

The blocks used in the construction of the 30, 33 and 36-inch sewer were what are known as Type C block, while those used in the large sewer were Type B blocks, all of which were manufactured by the American Sewer Pipe Co. All mortar used in this work was composed of one part Portland cement and one part clean river sand.

After completing the arch, all outside joints above the springing line were well filled with mortar and upon the removal of the center all inside joints were neatly pointed.

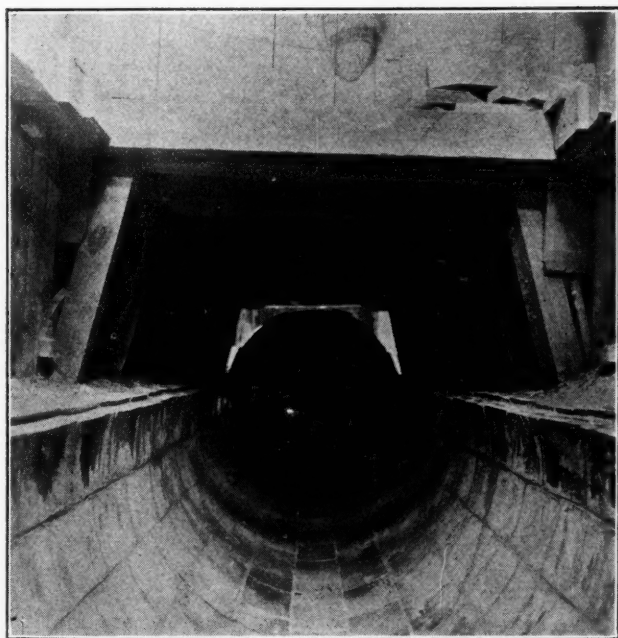


FIG. 1—BLOCK INVERT IN TUNNEL.

At all points where manholes were to be constructed, the blocks for a space of eight feet were omitted and after proceeding some distance in advance with the blocks the manhole and this 8-foot length were constructed of monolithic concrete.

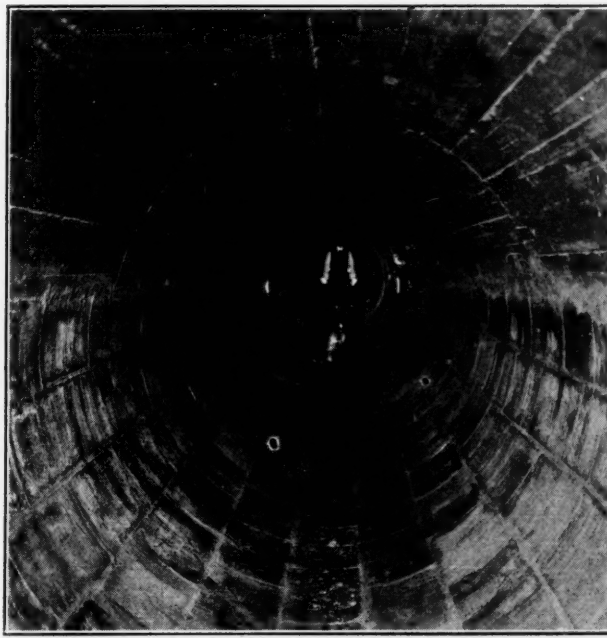
Photograph No. 1 shows a completed vitrified segment block invert which was constructed in tunnel. The end of the completed arch can be seen in the distance at the other end of the tunnel. This small portion of the sewer was constructed in this manner to prevent interference with the Southern Railroad Company's tracks directly above. All tunnel timbers were left in place and the space between the sewer and the timbers filled with a lean concrete composed of one part Portland cement, five parts sand and ten parts gravel.

Photograph No. 2 shows a portion of the 69-inch sewer which was constructed with a segment block invert and a 1-2-4 plain concrete arch. The arch is eight inches thick at the crown, increasing toward the springing line to fill the space between the inside of the block and the sheathing, and extending down behind the blocks about

nine inches below the springing line. This photograph shows how admirably the blocks may be used in combination with a concrete arch and where necessary on account of soil conditions the invert blocks could be laid in a concrete cradle.

The 23d street contract was started with a bricklayer as block setter, but after a few days a pipe layer was substituted and both contracts were almost entirely completed by pipe layers, with common or unskilled laborers as helpers. It was suggested by the engineer in charge of the construction of this sewer that the pipe layer was superior to the brick layer on this type of sewer owing to the fact that the block is a unit more nearly approaching the size and weight of the pipe layers unit. However this may be, we have found that it is not at all necessary to use brick layers on this kind of a sewer.

During the construction of the 23d street sewer a crow bar, which had been dropped from the top of the trench, penetrated an arch block and it therefore became necessary to remove this block and replace same with concrete. The difficulty encountered in the removal of this block showed that the joints had been well made and that the mortar formed a good bond between adjacent blocks.



BLOCK INVERT AND CONCRETE ARCH.

Tests made in the 23d street sewer showed a deflection and variation after refilling of less than one per cent.

As these sewers are constructed in a locality in which there is practically no ground water, we can gain no idea of the amount of infiltration to be expected in this type of sewer, but when properly constructed I do not believe this point will be a factor against the block sewer. The percentage of infiltration in my opinion will most certainly be less than in the case of a brick sewer as ordinarily constructed.

When properly constructed with clean neat joints, the coefficient of roughness should not exceed .013, as against .015 as ordinarily taken for brick sewers, thereby effecting a saving in cost due to reduced size. In this type of sewer it is almost absolutely necessary to use the inlets as originally placed, instead of promiscuously cutting into the sewer as has been too often done in some of our other sewers.

The most important point in connection with the segment block is the thickness of wearing surface and its power of resistance to abrasion. While I know of sev-

eral instances of the inverts of brick sewers being entirely worn away by abrasion, I have never seen a vitrified pipe sewer thus destroyed. Should time or tests show that the present thickness of about one inch is insufficient, this thickness could be increased to the desired amount.

IN TORRINGTON, CONNECTICUT.

By C. A. PATTERSON, Borough Engineer.

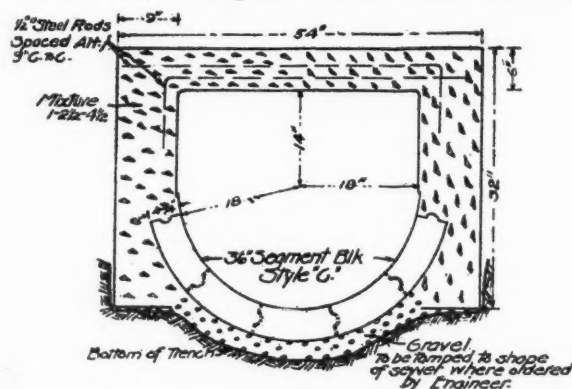
In September, 1912, preliminary plans were made for a storm sewer in Highland Avenue to drain one hundred acres abutting the street on the south and west. The writer's previous experience with sanitary sewers in this section of the city had taught him what to expect—a peculiar formation of about five feet of loam, two feet of gravel, and below that shifting clay (termed by some engineers quick sand), which would float through the joints in the sheeting when wet, but become very hard when dry. To build the sewer in this material deep enough so as not to interfere with the gas and water mains in intersecting streets would necessitate perfectly tight sheeting with sufficient strength to hold side pressure, and the sheeting must be left in to prevent upheaving and preserve alignment. The expense involved would make this prohibitive, and we decided to re-lay the gas and water mains (owned by a private corporation) so as to pass under the grade of the storm sewer, the first by two 45° bends and the latter by an S.

In considering the type of sewer to be used on this work, the segment blocks seemed to be especially adaptable, and after a careful comparison of costs the designs shown in the photographs were adopted, and bids were received on October 21, 1912, as follows:

compartments to flow into the channel of the manholes, which proved an advantage in water-bearing ground.

The great majority of manufacturing towns and cities in the East have grown so rapidly that the improvements have not kept up with the growth of the towns, and this is the case in Torrington. The water company has been allowed to lay its mains anywhere in the street, with no reference to street lines or anything else but the easiest course, and no records were kept showing the location of the pipes, and therefore we find them sometimes where we least expect to.

We had laid about 43 feet of the segment blocks when we uncovered two of the main water supply pipes of the city. To attempt to lower these would have been dangerous; therefore a concrete-steel rectangular section was substituted for the circular sewer, there being on each end of the rectangular section a short stretch con-



SECTION OF COMPOUND SEWER.

Bids Received for Segment Block and Concrete Sewers.

	42 in. Seg. Blk.	39 in. Seg. Blk.	36 in. Seg. Blk.	42 in. Conc'r	39 in. Conc'r	36 in. Conc'r
A.....	\$5.35	\$4.55	\$3.85	\$6.20	\$5.40	\$5.10
B.....	4.10	3.90	3.60	4.10	3.90	3.90
C.....	6.03	5.60	4.65	7.15	6.95	5.95
D.....	6.56	5.86	4.07	6.95	6.50	5.33
E.....	5.25	4.98	4.70	5.50	5.00	4.50
F.....	4.75	4.75	4.75	4.70	4.70	4.70

In excavating for these segment block sewers, the bottom of the trench, wherever possible, was graded to a templet up to the spring line, and a line of invert blocks laid first; after which the blocks were brought up to the spring line with a templet and held in place with selected material tamped behind them where necessary. In one section the invert came about a foot into the shifting clay. At this point a cradle was built to the shape of the sewer, in 12-foot sections of 2-inch plank, wide enough to hold one block each side of the invert block. After the invert block is laid, the male, female and shiplap joints are covered with a 1:2 mixture of cement and sea sand and the next block set in place.

In building up from the spring line a collapsible form was first tried, which proved clumsy and awkward, and later was discarded for two semi-circular templates, set so as to make a complete circle. Both sides are built up together until the last block, or key block, is forced into place. As soon as the circle is complete the inside joints are filled, where necessary, and carefully pointed to conform with the inner surface, and the outside joints are filled with a trowel and plastered to prevent leakage and possible weakening from frost.

Each block is hollow and composed of two compartments. The invert block of the inlet pipe to all manholes was raised the thickness of the block above the channel to allow the drainage which flowed through the

verging from the rectangular to the regular 42-inch sewer. (This is similar to a section built by Alexander Potter in Elizabeth, N. J., on the joint outlet sewer running under the Penn. R. R. bridge at Bayway.)

On sizes where an odd number of blocks are required, if the invert block is centered true to line, the last two blocks come together over the invert blocks, making a joint in the crown of the arch directly on line with the center of the invert block. The writer's experience with these was on 39-inch sewer, which required thirteen blocks per linear foot of completed sewer. To fully satisfy himself as to its crushing strength, about twenty feet of the sewer was completed and allowed to set twenty-four hours, then filled in, and one week later a fifteen-ton road roller, loaded to weigh eighteen tons, was run across the ditch at right angles to the line of sewer a dozen times, and after a careful examination he could find no signs of weakness. This was at a point where the pipe had a covering of only three feet.

Some trouble was experienced with warped blocks, and we found that blocks warped so as to bow one-half inch or more at the center either vertically or horizontally would not lay up true, and were thrown out.

A careful inspection was made of this sewer in April of this year and to all appearances it is in perfect condition. We are expecting to put in about 3,000 feet of this construction this season if we get an appropriation for the work.

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CHANGE OF ADDRESS

Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributions suitable for this paper either in the form of special articles or of letters discussing municipal matters, are invited and paid for.

Subscribers desiring information concerning municipal matters are requested to call upon MUNICIPAL JOURNAL, which has unusual facilities for furnishing the same, and will do so gladly and without cost.

JUNE 18, 1914.

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The Sewage Treatment Tables.

The list of sewage treatment plants which we publish this week is, so far as we know, by far the most complete one which has ever been prepared. It gives the location and general description of 410 municipal plants and 215 institutional and private ones—larger numbers than are probably thought to exist by a great many who are fairly well informed in the matter. There are moreover several municipal plants, to the number perhaps of 25, which we have not yet been able to obtain data concerning, but which we hope to give in a supplementary list in a few weeks; and the number of institutional and private plants may exceed our list by an even greater number, these being often known to few besides their owners.

This degree of completeness was made possible only by the co-operation of officials of many of the state health boards, and we wish to accord to them a large share of the credit for it, and to acknowledge our indebtedness. Especially valuable, because of the pains taken to furnish us with data complete and up to date, are the lists furnished us by C. A. Haskins, engineer in charge, Division of Water and Sewerage, Kansas Board of Health; Robert B. Morse, chief of the Bureau of Sanitary Engineering of the Maryland Department of

Health; X. H. Goodnough, chief engineer Massachusetts Board of Health; R. B. Fitz-Randolph, chief of Bureau of Food, Drugs, Water and Sewerage, New Jersey Board of Health; Theodore Horton, chief engineer of the New York Department of Health; W. H. Dittoe, chief engineer of the Ohio Board of Health, and Richard Messer, sanitary engineer of the Virginia Board of Health. In addition to these, several individuals not connected with state boards have assisted us with information and we have drawn upon partial lists found in reports and technical papers, and finally upon our own office records to supplement these.

With all this we are aware, however, as stated above, that the list is not complete, and we hope that any one who may know of plants not in this list will not fail to notify us of them in order that a supplementary list may make the record complete for the entire country.

Materials for Large Sewers.

A number of years ago brick (or sometimes stone) was about the only material in ordinary use for sewers of more than three feet diameter. Concrete came into common use for this purpose about twenty years ago and has now largely supplanted brick in most localities. On the other hand vitrified clay pipes are so much cheaper and generally superior to brick for smaller sewers that they have entirely driven the latter from the field.

One objection to brick was the difficulty of making a smooth, uniform cylindrical surface, and in some cases "invert blocks" of vitrified clay, formed to the true cylindrical surface and with radial joints, were substituted for brick in the invert. These were objectionable because they made a smooth joint entirely through the sewer, through which water could leak either inward or outward, and they could drop out of place if leakage or other water should scour out the soil from under them, there being no bond between them and the sewer.

The smoothness and curved exposed face of the blocks were advantages, and the radial joint faces made laying easier; but the failure to bond was a vital objection to their use for an entire sewer. Recent improvements appear to have overcome this objection, and a number of cities are now constructing large sewers of vitrified blocks. The engineers of three such cities describe in this issue the methods of using and the results obtained in their individual experiences. Another instance and a description of the block itself will be found in our issue of January 15.

The testimony of these reliable engineers, one of whom especially is widely known as a specialist in sewerage engineering, adds another material to those available for constructing large sewers. Local availability, freight rates and wages as affecting price, and conditions as to shape of cross-section and use to be made of it will be elements in the choice between brick, plain or reinforced concrete built in place, reinforced concrete pipe, segment blocks, wood-stave, timber, steel and possible other substances. Personal preference will of course play a considerable part in the selection; but for the trained and well informed man the wider the range of choice the greater the possibility of his obtaining in each case the exact material which is most suitable. And this addition of another material is therefore to be welcomed.

While the general idea of the segment block appears to be good and those used so far have given excellent results, different shapes and details of construction are already to be found on the market and each should be carefully considered and tried before adopting it. Tightness against leakage, rigidity, strength, durability, convenience of laying, smoothness of finished surface are a few of the more important qualities.

SEWAGE DISPOSAL IN THE UNITED STATES

Location and Brief Description of More Than Six Hundred Plants for Treating Sewage—Sewage Disposal and Stream Pollution in Several States—Aid by State Health Boards.

We are publishing this week a list of sewage disposal plants in this country which we believe to be the most complete that has ever been tabulated, or at least has ever appeared in print. We believe that in all but a few states we have complete records of all municipal plants, and in some states practically all institutional ones as well.

Several of the states take great interest in the matter of sewage disposal, and have prepared very complete records of all the plants of which they can learn within their states, among these being Maryland, Massachusetts, Michigan, New Jersey, New York, Ohio and Virginia. Where the State Boards of Health were able to furnish complete lists of disposal plants, we have given these lists in the tables published this week. It is possible that in some instances plants have been constructed which are not known to the board, and we have been able to supplement one or two of the lists from our own information. Where the state board did not furnish the information, we have indicated the names of the cities by asterisks. In two or three instances, the boards did not have lists prepared, but kindly offered to obtain the information as soon as possible, and if the lists received from them later should contain reference to plants not given in these tables (the information being obtained from other sources) we will publish them in supplementary tables later on. In at least two cases the State Board has written that they know of no purification plants in the state, although our office records contain the names of two or more.

Most of the information received is up to date. That of Connecticut, however, is three years or more old; that of Illinois is about a year old; that of North Dakota about a year old; that of Rhode Island two years old, and that of Wisconsin four years old. In these cases the information was derived from published reports, which accounts for the list not being necessarily up to date; but in each case we have supplemented the list by such later installations as we knew of, and in saying that they are not up to date, we merely mean that the official report of the board from which we have prepared our list was not for the present year. In the majority of cases the Board has either furnished a supplementary list giving the latest installations, or has prepared the entire list especially at our request.

In the case of Ohio, the chief engineer of the Board, W. H. Dittoe, informs us that the list does not include the private residential plants nor those for the treatment of manufacturing waste, of which there are several in the state. The plant at Urbana is the only one under construction at the present time, but, as stated in our issue of June 4, Akron, Clinton and Cleveland are soon to receive bids, while Toledo and Sandusky are preparing to do so.

Concerning the Virginia records, Richard Messer, sanitary engineer of the Board, states that there are a large number of small private installations for suburban and country homes which are not listed by the Board, and which for the most part consist of septic tanks alone or septic tanks with subsurface irrigation.

E. J. McCaustland, who is president of the Board of Health of Washington and Professor of Municipal Engineering in the University of Washington, writes that

there are practically no complete and satisfactory plants for sewage treatment in that state, but that there are a large number of so-called septic tanks which are not working satisfactorily, and one installation of an Imhoff tank which is doing good work when it is carefully attended to. The Board is given advisory powers, but has never been furnished with funds enabling it to look after this class of work as it should.

Concerning Maryland's plants, Mr. Morse writes that besides the plants listed there are a number of others for small villages and real estate sub-divisions in the suburbs of both Baltimore and Washington. Some of these were installed at a time when there was no state supervision whatever, and many are improperly designed and built and entirely inadequate, for which reason he has not included them in the list. This list also does not include plans for public institutions, of which there are a number in the state.

In Virginia there are no special laws giving the Board of Health authority to regulate the disposal of sewage and trade wastes. Richard Messer, the sanitary engineer of the boards sends the following information: There are only two towns in the state maintaining sewage treatment plants—Winchester, with a population of 6,000, and Colonial Beach, a summer resort, with a winter population of 1,000 and a summer population of 12,000 to 15,000.

It is not unnatural that this subject should have been overlooked in Virginia, when it is considered that the total population of about 2,100,000 is distributed over an area of more than 40,000 square miles; that only 26½ per cent of the population is collected in communities of more than 1,000 each, and that there are only two cities having a population of more than 50,000 and eight others having a population of between 10,000 and 50,000. Furthermore, most of the larger cities and towns are situated in the eastern part of the state and discharge their sewage directly into Chesapeake Bay, or into tide water in some of the larger streams emptying into it. In fact, less than 11 per cent of the entire population resides in communities of more than 1,000 which are not located on tidal waters.

There are, however, two noticeable cases of pollution which need to be remedied. The James River is polluted by sulphate waste liquors at Covington, the dark discoloration from which is noticeable for a distance of 250 miles down the stream. The oyster grounds near Hampton Roads and along the Potomac River are polluted by the sewage of several cities. Aside from these cases, there will probably be no great demand for sewage treatment until the state becomes more thickly populated away from the tidal waters.

One of the unexpected items of information obtained by us in our efforts to secure a complete list of the sewage disposal plants in the United States, was that so many of the State Boards of Health did not pretend to have any information on the subject, and some of them appeared to think it very peculiar that anyone should imagine that they would have. It is now generally recognized that the function of a State Board of Health is not only to tabulate causes of deaths, but a much more urgent one is to prevent them as far as possible; and sewerage and water supply are features of municipal life

(Continued on page 906).

SEWAGE TREATMENT PLANTS IN THE UNITED STATES. MUNICIPAL.

Cities operating sewage treatment plants.	General description of plant.	Amount of sewage treated, in gallons per day, or in percentage of the whole amount originating in the community.
Alabama		
Birmingham*	Septic tanks	
Arizona		
Douglas*	Septic tank	
Phoenix*	Septic tank	
Arkansas		
Camden*	Septic tank	
Eldorado*	Three septic tanks	
Eureka Springs*	Septic tank and filter beds	
Fayetteville*	Septic tank and filter bed	
Little Rock*	Septic tanks	
Russellville*	Septic tank	
Stuttgart*	Septic tank	
Texarkana*	Septic tank	
California		
Fresno*	Settling tanks	
Marysville*	Sewage farm.	
Pasadena*	Septic tank and sewage farm.	
Petaluma*	Septic tank.	
Pomona*	Sewage farm.	
Santa Clara*	Septic tank and sewage farm.	
Santa Rosa*	Septic tank and sewage farm.	
Colorado		
Colorado*	No disposal plants known of.	
Connecticut		
Bristol*	Filters	
Danbury*	Sand filters and broad irrigation.	
Litchfield	Sand filters and broad irrigation.	
Manchester	Intermittent filters and broad irrigation	
Delaware		
Meriden*	Sand filtration	
New Britain*	Sand filtration	
Norfolk	Intermittent sand filters.	
Ridgefield	Sand filters	
Rockville	Septic tanks and contact beds.	
Linsbury	Sand filters.	
So. Manchester	Sand filters.	
Dist. of Columbia*	No disposal plants known of.	
Florida		
Gainesville*	Septic tank.	
Tallahassee*	Septic tank.	
Georgia		
Atlanta*	Imhoff tanks and sprinkling filters	
Decatur*		
Illinois		
Aledo	Sedimentation and percolating filters.	
Arlington Heights	Sedimentation and intermittent sand filters	
Indiana		
Barrington	Septic tanks.	
Canton*	Two-story sedimentation and percolating filters	
Carthage		
Iowa		
Collinsville	Septic tanks, two plants.	
Kansas		
Baldwin	Two plants, septic tanks and contact filters	
Burlingame	Imhoff tank and contact filter.	
Burlington	Septic tank.	
Caldwell	Septic tank.	
Cherryvale	Septic tank and contact filters.	
Coffeyville	Two septic tanks.	
Columbus	Two plants, septic tank and contact filter	
Council Grove	Imhoff tank and contact filter under construction	
Erie	Septic tank.	
Eureka	Septic tank.	
Fort Scott	Septic tank under construction.	
Fredonia	Septic tank.	
Garnett	Two plants, septic tank and contact filter	
Girard	Septic tank and contact filter	
Great Bend	Septic tank.	
Halstead	Septic tank.	
Harper	Septic tank and contact filter.	
Hays	Septic tank.	
Herington	Septic tank.	
Hiawatha	Septic tank and sub-irrigation	
Holington	Septic tank.	
Holton	Septic tank and contact filter	
Kentucky		
Lexington	Septic tanks, two plants.	
Louisiana		
Baton Rouge	Septic tanks, two plants.	
Maine		
Bangor	Septic tanks, two plants.	
Massachusetts		
Amherst	Septic tanks, two plants.	
Michigan		
Ann Arbor	Septic tanks, two plants.	
Minnesota		
St. Paul	Septic tanks, two plants.	
Mississippi		
Meridian	Septic tanks, two plants.	
Missouri		
St. Louis	Septic tanks, two plants.	
Montana		
Butte	Septic tanks, two plants.	
Nebraska		
Omaha	Septic tanks, two plants.	
Nevada		
Las Vegas	Septic tanks, two plants.	
New Hampshire		
Manchester	Septic tanks, two plants.	
New Jersey		
Paterson	Septic tanks, two plants.	
New Mexico		
Albuquerque	Septic tanks, two plants.	
New York		
Albany	Septic tanks, two plants.	
Buffalo	Septic tanks, two plants.	
Rochester	Septic tanks, two plants.	
Syracuse	Septic tanks, two plants.	
North Carolina		
Raleigh	Septic tanks, two plants.	
North Dakota		
Bismarck	Septic tanks, two plants.	
Ohio		
Cincinnati	Septic tanks, two plants.	
Columbus	Septic tanks, two plants.	
Oklahoma		
Lawton	Septic tanks, two plants.	
Oregon		
Portland	Septic tanks, two plants.	
Pennsylvania		
Philadelphia	Septic tanks, two plants.	
Pittsburgh	Septic tanks, two plants.	
Rhode Island		
Providence	Septic tanks, two plants.	
South Carolina		
Columbia	Septic tanks, two plants.	
South Dakota		
Sioux Falls	Septic tanks, two plants.	
Tennessee		
Memphis	Septic tanks, two plants.	
Texas		
Austin	Septic tanks, two plants.	
Dallas	Septic tanks, two plants.	
Houston	Septic tanks, two plants.	
Vermont		
Windsor	Septic tanks, two plants.	
Virginia		
Richmond	Septic tanks, two plants.	
Washington		
Seattle	Septic tanks, two plants.	
West Virginia		
Charleston	Septic tanks, two plants.	
Wisconsin		
Madison	Septic tanks, two plants.	
Wyoming		
Cheyenne	Septic tanks, two plants.	

*Information from source other than State Board of Health. pPopulation served.

SEWAGE TREATMENT PLANTS IN THE UNITED STATES. MUNICIPAL.—Continued.

Cities operating sewage treatment plants.	General description of plant.	Amount of sewage treated, in gallons per day, or in per- centage of the whole amount originating in the community.	Amount of sewage treated, in gallons per day, or in per- centage of the whole amount originating in the community.
Kansas—(Continued)			
Horton	Septic tank and contact filter.....All	3,600	
Humboldt	Septic tank.....All	2,548	
Independence	Septic tank and contact filters.....60%	10,480	
Iola	Septic tank.....All	9,032	
Lyndon	Septic tank and contact filter.....	763	
McPherson	Septic tank and Imhoff tank.....	3,546	
Marion	Septic tank.....	1,841	
Newton	Septic tank.....	7,862	
Osage City	Septic tank and contact filters.....	2,432	
Osborne	Septic tank under construction.....	1,566	
Oswego	Septic tank and contact filters.....50%	2,317	
Parsons	Two septic tanks.....All	12,463	
Peabody	Septic tank.....	1,416	
Pratt	Septic tank.....	3,302	
Sabetha	Two plants, septic tanks and contact filters.....	1,768	
Sedan	Septic tank not in use.....	1,211	
Seneca	Septic tank and contact filter.....All	1,806	
Stafford	Septic tank and contact filter.....	1,927	
Valley Falls	Imhoff tank under construction.....	1,129	
Washington	Septic tank.....	1,547	
Wellington	Two septic tanks.....	7,034	
Yates Center	Septic tank and contact filter.....	2,024	
Kentucky			
Berea	Septic tank.....All		
Danville	Septic tank.....Nearly all		
Franklin	Septic tank.....Nearly all		
Hopkinsville	Septic tank.....50%		
Murray	Septic tank.....25%		
Nazareth	Imhoff tank and sprinkling filter.....All		
Shelbyville	Septic tank.....33 1/4%		
Silver Grove	Septic tank.....All		
Winchester	Septic tank.....50%		
Louisiana			
Lake Charles	Septic tanks.....66 2/3%		
Opelousas	Screens, grit chamber, Imhoff tanks, percolating filters, sludge beds.....All		
Maine			
Baltimore	No purification plants known of.		
Maryland			
Baltimore	Main plant: Screen chamber, hydrolytic and sludge digesting tanks, revolving screens, sprinkling filters and final settling basins. Imhoff tanks now being added and capacity otherwise increased. May be disinfected. Forest Park plant: Hydrolytic and sludge digesting tanks, sprinkling filters and final settling basins. Walbrook plant: Imhoff tanks, sprinkling filters and final settling basins.....All		
Easton	Two plants, settling tanks and hypo- chlorite disinfection.....All		
Missouri			
*Columbia	Septic tank.....Small part only		
*St. Louis	Septic tank.....		
*Sedalia	Septic tank and filters.....		
Nebraska			
*Hastings	Septic tank.....		
New Jersey			
Allenhurst	Sedimentation.....100,000		
Asbury Park	Sedimentation.....1,700,000		
Atlantic City	Sedimentation and disinfection.....Part only	160,000	
Audubon	Sedimentation, contact bed and sand filters.....		
Avon	Sedimentation.....200,000		
Beach Haven	Sedimentation.....70,000		
Belmar	Sedimentation.....150,000		
Beverly	Sedimentation and disinfection.....200,000		
Bivalve	Pool system.....		
Bordentown	Sedimentation, double contact and sand filters.....		
Bradley Beach	Sedimentation, two plants.....260,000		
Bridgeton	Sedimentation, disinfection and two hours' storage, two plants.....140,000		
Browns Mills	Sedimentation, contact beds and dis- infection.....290,000		
Burlington	Sedimentation and broad irrigation.....10,000		
Caldwell	Sedimentation.....700,000		
Cape May	Sedimentation.....1,000,000		
Charlstadt	Sedimentation.....125,000		
Changewater	Sedimentation and sand filtration.....2,000		
Chatham and Madison	Sedimentation, double contact and sand filters.....400,000		
Cliffside Park	Sedimentation.....300,000		
Collingswood	Sedimentation and contact beds.....2,500		
Cresskill	Sedimentation and broad irrigation.....150,000		
Deal Beach	Sedimentation.....80,000		
Delford	Sedimentation.....210,000		
E. Rutherford	Sedimentation.....560,000		
Englewood	Sedimentation, contact beds and sand filters.....40,000		
Essex Fells	Sedimentation and contact beds.....200,000		
Fairview	Screens and land filtration.....400,000		
Flemington	Two plants, sedimentation and sub- surface irrigation; also sedimentation surface irrigation.....		
Freehold	Sand seepage.....		
Gibbstown	Sedimentation, sprinkling filters and secondary sedimentation.....225,000		
Haddonfield	Sedimentation and sand filters.....70,000		
Haddon Heights	Sedimentation, sprinkling filters and settling.....		
Hammononton	Sedimentation and subsurface irrigation.....6,000		
Haworth	Sedimentation and contact beds.....		
Helmetta	Sedimentation and contact beds.....		

City	Plant	Capacity	Cost	Notes
Ridgely	Septic tank and hypochlorite disinfection			
Roland Park	Jones Falls plant: Intermittent sand filters.			All
	Stony Run plant: Imhoff tank..			All
Massachusetts				
Amherst	Sand filters, settling basins.	210,000		
Andover	Sand filters, settling basins.	300,000		
Attleboro	Sand filters.			
Billerica	Sedimentation and sand filters.			
Brookton	Revolving screen, trickling filters (for part of sewage only), humus tank and sand filters.	1,752,000		
Clinton	Sand filters, settling basins.	1,037,000		
Concord	Sand filters.	395,000		
Easthampton	Sedimentation and sand filters.	360,000		Part only
Fitchburg	Five Imhoff tanks, trickling filters and secondary settling tanks under construction.			
Framingham	Sand filters.	637,000		
Franklin	Sedimentation and sand filters.	90,000		Part only
Gardner	Sand filters, 2 plants, one with settling tank.			
Hopedale	Settling tank and sand filter.	705,000		
Hudson	Settling tank and sand filter.	90,000		
Leicester	Settling tank and sand filter.	245,000		
Lenox	Settling tank and sand filter.			
Longmeadow	Settling tank and sand filter.	80,000		Part only
Marion	Sand filter.	95,000		
Marlborough	Settling tank and sand filter.	880,000		
Maynard	Sand filters.	16,800		Part only
Medfield	Settling tanks and sand filters.			
Milford	Settling tanks and sand filters.			
Natick	Sand filters.	433,000		
No. Attleboro.	Settling tanks and sand filters.	666,000		
Northbridge	Settling tanks and sand filters.	640,000		
Norwood	Settling tanks and sand filters.	260,000		
Pittsfield	Sand filters.	450,000		
Southbridge	Settling tanks and sand filters.	1,921,000		
Spencer	Sand filters.	840,000		
Stockbridge	Sand filters.	410,000		
Westborough	Sand filters.			
Worcester	16 chemical precipitation tanks for night sewage only, sand filters for day sewage.	400,000		
		11,480,000		
Michigan				
Cadillac	Septic tanks (new plant contemplated).	700,000		
Caro	Septic tanks and sand filters.	72,000		
Coldwater	Septic tanks.	2,000,000		
Charlevoix	Septic tank.			Part only
Durand	Septic tanks and sand filters.			
Tremont	Septic tank.	4,600		
Ithaca	Septic tank and sand filters.			
Jackson	Septic tank and sand filters.			
Petoskey	Septic tank.			Part only
St. Johns.	Natural sand filters.			
Sturgis	Septic tanks and horizontal flow contact filters.			
Minnesota				
*Bemidji	Septic tank.			
*Duluth	Septic tanks.			Part only

*Information from source other than State Board of Health. p Population served.

SEWAGE TREATMENT PLANTS IN THE UNITED STATES. MUNICIPAL.—Continued.

Cities operating sewage treatment plants.	General description of plant.	Amount of sewage treated, in gallons per day, or in per- centage of the whole amount originating in the community.
Ohio—(Continued)		
Marion	Sedimentation, contact and intermittent sand filtration	20,000 p
Marysville	Sedimentation, contact and intermittent sand filtration	All
Medina	Two plants, sedimentation and sprinkling filters	"
Mt. Gilead	Sedimentation and intermittent sand filtration	"
New Berlin	Sedimentation and intermittent sand filtration	"
New Bremen	Sedimentation and disinfection	"
Oberlin	Sedimentation and intermittent sand filtration	"
Orrville	Sedimentation and intermittent sand filtration	"
Oxford	Sedimentation and intermittent sand filtration	"
Plain City	Sedimentation and contact filtration	"
Ravenna	Sedimentation and intermittent sand filtration	"
Salem	Sedimentation and intermittent sand filtration	9,300 p
Sebring	Sedimentation and intermittent sand filtration	All
St. Marys	Sedimentation and intermittent sand filtration	"
Shelby	Sedimentation and intermittent sand filtration	"
Shreve	Sedimentation and contact filtration	"
Sylvania	Sedimentation, contact and intermittent filtration	"
Urbana	Sedimentation and contact filtration (under construction)	"
Wadsworth	Sedimentation, contact and intermittent sand filtration	All
Westerville	Sedimentation and contact filtration	"
Wyoming	Sedimentation and intermittent sand filtration	"
Xenia	Sedimentation and intermittent sand filtration	"
Oregon		
Ashland	Septic tanks	"
Forest Grove	Septic tanks	"
Hillsboro	Septic tanks and irrigation	"
Klamath Falls	Septic tanks and filter bed	"
La Grande	Septic tanks and irrigation	"
Pennsylvania		
* Altoona	Intermittent filtration	5,000 p
* Reading	Precipitation and sprinkling filters	4,579 p
Rhode Island		
Central Falls	Septic tank and sand filtration	12,683 p
Narragansett Pier	Septic tank	3,929 p
Pawtucket	Sedimentation and sand filters	3,000 p
		6,588 "
New York—(Continued)		
Brewster	Chemical disinfection and filtration	1,296 p
Briarcliff Manor	Septic tank and sand filters	980 p
Brockport	Septic tank and contact beds	3,579 p
Colonie School District No. 19	Settling tank (not yet in use)	"
Corinth	Septic tank	2,166 p
Dansville	Septic tank and contact beds	3,936 p
Depew	Septic tank and contact beds	3,921 "
Dolgeville	Septic tank	2,685 p
East Aurora	Septic tanks, contact bed and sludge bed	2,781 p
East Rochester	Screening and grit chamber	2,398 p
E. Syracuse	Septic tank	3,274 p
Frankfort	Screen, Imhoff tank and sludge beds	3,303 p
Franklinville	Settling tank, broad irrigation and sludge beds	1,568 p
Fulton	Septic tank	2,500 p
Fultonville	Septic tank	812 p
Gloversville	Settling tanks, sprinkling filters and sand filters	20,600 p
Hempstead	Septic tank and sand filters	5,000 p
Hobart	Settling tank, sand filters and sludge beds	544 p
Ithaca	Septic tank	14,802 p
Kingston	Septic tank and contact beds	3,939 p
Lackawanna	Septic tank and contact bed	14,549 p
Lake Placid	Septic tank and sand filters	1,682 p
Lancaster	Septic tank and contact bed	4,364 p
Liberty	Septic tank and contact beds	2,072 p
Mattawan	Septic tank and contact beds	6,727 p
Middleport	Imhoff tank, sprinkling filter and sludge bed	1,530 p
Monticello	Septic tank, contact beds and sand filters	1,941 p
Mt. Kisco	Septic tanks, contact beds and sand filters	2,800 p
Mt. Vernon	Septic tanks and sprinkling filters	30,919 p
New Hartford	Settling tanks and sludge beds	2,900 p
New Rochelle	Chemical precipitation	Part
New York City	Coney Island: Three plants, chemical precipitation	"
	Elmhurst: Chemical precipitation, septic tank and sand filters	"
	Far Rockaway: Chemical precipitation	"
	Jamaica: Chemical precipitation	"
	New Lots: Chemical precipitation	"
	Septic tanks and sprinkling filters	"
North Olean	Settling tanks and sprinkling filters	"
Pelham	Settling tank and contact bed	"
Pen Yan	Septic tank and sand filters	"
Saratoga Springs	Septic tank and sand filters	"
Saugerties	Septic tank and sand filters	"
Scotia	Septic tank and sand filters	"
Seneca Falls	Settling tank and sludge bed	"

Sharon Springs.....	Septic tank.....	2,500 p	Providence.....	Chemical precipitation.....	
Skaneateles.....	Septic tank.....	1,615 p	Woonsocket.....	Septic tank and sprinkling filter.....	
Stamford.....	Chemical precipitation.....	973 p	South Carolina		
Tuxedo Park.....	Septic tanks and percolating filter.....	3,000 p	*Aiken.....	Intermittent sand filtration.....	
Westfield.....	Septic tanks, contact beds and sludge beds.....	2,985 p	*Greenwood.....	Septic tank and four sprinkling filters.....	
Windsor Beach.....	Septic tanks and sprinkling filter.....	1,000 p	*Newberry.....	Septic tanks and contact beds.....	
North Dakota			*Rock Hill.....	Septic tanks and contact beds.....	
Dickinson.....	Septic tank.....		*Sumter.....	Septic tanks and contact beds.....	
Ellendale.....	Septic tank.....		South Dakota		
Grafton.....	Septic tank.....		*Mitchell.....	Septic tank.....	
Jamestown.....	Septic tank.....		Texas		
Ohio			*Corsicana.....	Chemical precipitation.....	
Alliance.....	Two plants; chemical precipitation, sedimentation, contact and intermittent sand filtration.....		*Houston.....	Coke filter beds.....	
Amherst.....	Sedimentation and intermittent sand filtration.....	16,900 p	Utah		
Andover.....	Sedimentation and intermittent sand filtration.....		Beaver City.....	Septic tank.....	
Ashland.....	Sedimentation and intermittent sand filtration.....		Murray.....	Septic tank.....	
Bedford.....	Sedimentation and contact filters.....	7,600 p	Olmstead.....	Septic tank.....	
Bellefontaine.....	Sedimentation and contact filters.....	8,700 p	Price.....	Septic tank.....	
Canton.....	Chemical precipitation.....	56,000 p	Virginia		
Chagrin Falls.....	Sedimentation, contact and intermittent sand filtration.....		Blacksburg.....	Sedimentation and contact beds (under construction).....	50%
Clyde.....	Intermittent sand filtration on natural soil.....		Chase City.....	Septic tank and broad irrigation.....	50%
College Hill.....	Sedimentation, sprinkling filters and final settling tanks.....		Colonial Beach.....	Septic tanks.....	70%
Columbus and Grandview.....	Sedimentation, sprinkling filters and final settling tanks.....	200,000 p	Culpeper.....	Broad irrigation.....	
Delaware.....	Sedimentation and contact filtration.....	9,500 p	Manassas.....	Imhoff tank and trickling filter (under construction).....	75%
Delphos.....	Sedimentation.....		Winchester.....	Screen and intermittent sand filter.....	
Eaton.....	Sedimentation and intermittent sand filtration.....		Washington		
Fostoria.....	Sedimentation and intermittent sand filtration.....		*Seattle.....	Septic tanks.....	Small part
Galion.....	Sedimentation and contact filtration.....		West Virginia	No disposal plants known of.....	
Geneva.....	Sedimentation and intermittent sand filtration.....		Wisconsin		
Hudson.....	Sedimentation, contact and sand filtration.....		*Antigo.....	Septic tanks and filters.....	
Jackson.....	Sedimentation and contact filtration.....	7,200 p	*Athens.....	Septic tank.....	
Jefferson.....	Sedimentation and intermittent sand filtration.....		*Elkhorn.....	Residential septic tanks.....	
Kenton.....	Sedimentation and coarse grain filtration.....		*Fond du Lac.....	Septic tank and contact beds.....	
Lakewood.....	Sedimentation and contact filtration.....		*Lancaster.....	Septic tank and filters.....	
Lockland.....	Sedimentation and contact filtration.....		*Madison.....	Septic tank and trickling filter.....	
London.....	Sedimentation and contact filtration.....		*Marshfield.....	Septic tank and filters.....	
Louisville.....	Sedimentation and intermittent sand filtration.....		*Marquette.....	Filters.....	
Mansfield.....	Sedimentation and contact filtration.....		*Menomonee Falls.....	Sedimentation.....	
Marble Cliff.....	Sedimentation and contact filtration.....	21,700 p	*Monroe.....	Septic tank and filters.....	
			*No. Milwaukee.....	Sedimentation tanks, aeration and filters.....	
			*Ripon.....	Filters.....	
			*Tomah.....	Septic tanks.....	
			*Waupaca.....	Septic tanks.....	
			*Wauwatosa.....	Septic tank and sand filters.....	
			*Waukesha.....	Septic tank.....	
			*West Bend.....	Septic tank and slag filters.....	
			*West Salem.....	Septic tank.....	
			Wyoming		
			*Sheridan.....	Settling tank.....	
				Septic tank and gravel beds.....	

*Information from sources other than State Board of Health.
p Population served.

SEWAGE TREATMENT PLANTS IN THE UNITED STATES. INSTITUTIONAL AND PRIVATE.

Institutions or private parties operating sewage treatment plants.	Amount of sewage treated, gallons per day.	General description of plant.	Amount of sewage treated, gallons per day.
Georgia			
* Peachtree Heights, sanatorium			
* State tuberculosis sanatorium			
Kansas			
Fort Leavenworth		Septic tank and sprinkling filter	
Quindaro		Septic tank and sub-irrigation	
Soldiers' Orphan's Home		Septic tank and contact filters	
State Home for Feeble-Minded		Imhoff tank, contact filter and sand filter	
Topeka Industrial Institute		Septic tank and sub-irrigation	
University of Kansas		Septic tank and contact beds	
Kentucky			
Bethel College		Septic tank	
Logan Female College		Septic tank	
Waverly Hills, sanatorium		Imhoff tank, sprinkling filter and intermittent sand filtration	
Massachusetts			
Barnstable Normal School	6,000	Sedimentation and sub-surface filters	
Canton, Mass. hospital school	6,000	Sand filters	
Concord, Mass. reformatory	150,000	Sedimentation and sand filters	
Danvers, insane hospital	150,000	Sedimentation	
Foxboro, state hospital	p450	Sedimentation and sand filters	
Framingham, normal school	p310	Sedimentation and sub-surface filter	
Gardner, state colony	12,000	Sedimentation and sand filters (Part only)	
Lancaster, girls' school		Sedimentation and sand filters	
Medfield, state hospital		Sedimentation and sand filters	
Monson, state hospital	p1,700	Sedimentation and sand filters	
North Reading, sanatorium	90,000	Sedimentation and sand filters	
Rutland, prison camp	16,000	Sedimentation and sand filters	
Rutland, state sanatorium	10,000	Sedimentation and sand filters	
Tewksbury, almshouse	p350	Sedimentation and sand filters	
Wellesley College	250,000	Sedimentation and sub-surface filter	
Westboro, state hospital	p1,250	Sedimentation and sand filters	
Worcester, Grafton colony	300,000	Sand filters (under construction)	
New Jersey			
Aldene, factory	5,500	Sedimentation and trickling bed	
Ancora, institution		Sedimentation and sub-surface irrigation	
Asyla, institution	50,000	Sedimentation, contact bed and trickling filter	
Burlington, factory	40,000	Sedimentation, sprinkling filter and sand filter	
Institutions or private parties operating sewage treatment plants.			
New York			
Alfred, university		Cesspools	
Albion, house of refuge		Coke strainer and percolating filter	
Bath, Soldiers' and Sailors' Home		Chemical precipitation	
Bedford Hills		Imhoff tank and subsurface irrigation	
Bedford, reformatory for women		Septic tank, sand filter and sterilization	
Bedford, sanatorium		Septic tank and sprinkling filter	
Blauvelt, rifle range		Settling tank and sand filter	
Carmel, Glencida hotel		Septic tank, trickling filter and sterilization	
Central Islip, state hospital		Natural sand filtration	
Chappaqua, assembly		Chemical precipitation	
Chappaqua, convalescents' home		Screen chamber, settling tank, contact beds and sand filters	
Clifton Springs, sanatorium		Screen chamber, settling tank, sprinkling filter and sludge bed	
Colonie, private		Septic tank, dosing chamber and contact beds	
Comstock, prison		Settling tank and sand filters	
Dannemora, State prison		Settling tank	
Deerfield, private		Septic tank	
East View, almshouse		Septic tank and contact beds	
East View, convalescents' home		Septic tank and soil filtration	
Elka Park		Settling tank and contact beds	
Fair Haven, hotel		Septic tank and sub-surface irrigation	
Fire Island, state park		Cesspools and sub-surface irrigation	
Fourth Lake, camp		Settling tanks	
Fulton, county tuberculosis hospital		Settling tank and sub-surface irrigation	
Granville, factory		Settling tank and subsurface irrigation	
Great Neck		Sedimentation tanks and sand filters	
Greenburg, farm		Settling tank and subsurface irrigation	
Garden City		Septic tank and sand filtration	
Glen Haven, hotel		Settling tanks, primary and secondary contact	
Hawthorne, Jewish A. & P. Society		Primary and secondary contact beds	
Hudson, girls' school		Septic tank and contact beds	
Industry, agricultural school		Six plants, sedimentation and sand filters	
Jamesville, penitentiary		Sedimentation and contact beds	
King's Park, hospital		Imhoff tank and sprinkling filter	
Lebanon Springs, hotel		Septic tank and soil filtration	
Letchworth, State institution		Settling tanks, sprinkling filters, settling basin, sludge tank and sludge bed	
Lilly Vale, association		Sedimentation	
Lima, seminary		Settling tank and subsurface irrigation	

Bryam, private.....	Sedimentation and sub-surface irrigation.....	300	Long Beach, realty company.....	Settling tank and disinfection.....	
Caldwell, penitentiary.....	Sedimentation and sub-surface irrigation.....	40,000	Loomis, sanatorium.....	Septic tank, contact beds and sand filters.....	
Cape May, real estate company.....	Sedimentation and disinfection.....	18,000	Madeline Lake, private.....	Siphon chamber and two sand filters.....	
Clinton, creamery.....	Chemical precipitation.....	300	Manhattan Beach, hotels.....	Settling tanks.....	
Colt's Neck, creamery.....	Chemical precipitation.....	500	Monroe County Hospital.....	Settling tank, sand filters and sludge bed.....	
Deal Golf Club.....	Sedimentation and sand filters.....	1,200	Montgomery County Hospital.....	Settling tank and sub-surface irrigation.....	
Gibbsborough, factory.....	Sedimentation and sub-surface irrigation.....	50,000	Morrisville, school.....	Septic tank, dosing tank and subsurface irrigation.....	
Glen Gardner, institution.....	Sedimentation and sub-surface irrigation.....		Nauvut, school.....	Septic tank and soil filtration.....	
Grenloch, factory.....	Sedimentation, sprinkling filters and cinder filters.....		Napanoch, reformatory.....	Sedimentation tanks and sand filters.....	
Hackettstown, leather company.....	Sedimentation, contact filters and sand filters.....		Onondaga Co. house.....	Cesspools.....	
High Bridge, private.....	Sedimentation and broad irrigation.....		Owasco, country club.....	Septic tank and sand filters.....	
Hilliard's Island, private.....	Sedimentation and sand filters.....	1,500	Pine Bush, milk company.....	Cesspools.....	
Hopatcong, hotel.....	Sedimentation and sub-surface irrigation.....		Piermont - on - Hudson, hotel.....	Septic tank and coke bed.....	
Hopewell, institution.....	Sedimentation and contact beds.....	60,000	Pine Plains, farm.....	Settling tank and sand filters.....	
Jamesburg, institution.....	Screens and land filtration.....	50,000	Pleasantville, benevolent home.....	Sedimentation, sprinkling filter, sand filter and sterilization.....	
Lawrenceville, school.....	Sedimentation and broad irrigation.....	1,800	Pocantico Hills, college.....	Sedimentation tanks, broad and sub-surface irrigation.....	
Madison, private.....	Sedimentation and sand filters.....		*Point O' Woods, association.....	Sub-surface irrigation.....	
Mahwah, factory.....	Sedimentation and sand filters.....		Poughkeepsie, hospital.....	Settling tank, dosing chamber and subsurface irrigation.....	
Metuchen, creamery.....	Precipitation and sprinkling filters.....	800	Poughkeepsie, college.....	Natural sand filtration or broad irrigation.....	
Montague, creamery.....	Chemical precipitation.....	400	Ray Brook, hospital.....	Septic tank and sand filtration.....	
Morris Plains, institution.....	Two plants, sedimentation and sand filters and land filtration.....	670,000	Rockaway Beach, real estate company.....	Settling tanks.....	
Mullica Hill, private.....	Sedimentation and sand seepage.....	250	Round Lake, resort.....	Chemical precipitation.....	
Neshanic, creamery.....	Chemical precipitation.....		Rye, benevolent home.....	Primary and secondary contact.....	
New Lisbon, institution.....	Two plants, sedimentation, contact bed, sand filters and sub-surface irrigation.....	55,000	Rye, school.....	Primary and secondary contact.....	
New Providence, institution.....	Sedimentation, contact beds and absorption.....		Saratoga County.....	Septic tank, sprinkling filter, final settling tank and sludge bed.....	
Overbrook, institution.....	Sedimentation, contact beds and sand filters.....		Saratoga Springs, private.....	Septic tank and contact beds.....	
Pleasantville, hotel.....	Sedimentation and trickling filters.....	4,000	Schenectady, hospital.....	Settling tank and sub-surface irrigation.....	
Powerville, factory.....	Sedimentation, contact beds and cinders.....		Silver Bay.....	Septic tank, sprinkling filter and subsurface irrigation.....	
Princeton College.....	Sedimentation, sprinkling filters and sand filters.....	250	Silver Lake, sanatorium.....	Septic tank, sprinkling filter and broad irrigation.....	
Quarryville, creamery.....	Sedimentation and lime precipitation.....	50,000	Smithtown, hotel.....	Settling tank.....	
Rahway, reformatory.....	Sedimentation and disinfection.....		Sonyea, benevolent home.....	Septic tank and sand filters.....	
Ralston, institution.....	Sedimentation and sub-surface irrigation.....		South Nyack, private.....	Sedimentation tank and siphon chamber.....	
Rockaway, factory.....	Sedimentation and disinfection.....	1,500	Spring Valley, orphanage.....	Broad irrigation.....	
Ross Fenton, farm.....	Sedimentation and sand filters.....	20,000	Tompkins County.....	Septic tank and subsurface irrigation.....	
Sea Girt, state camp.....	Sedimentation and sand filters.....	50,000	tuberculosis hospital.....	Septic tank and subsurface irrigation.....	
Skillman, institution.....	Sedimentation, contact beds and land filtration.....		Thompson's Ridge, ice cream company.....	Broad filtration.....	
Smith's Landing, institution.....	Sedimentation and disinfection.....	8,000			
Sunnyside, creamery.....	Chemical precipitation.....				
Three Bridges, creamery.....	Chemical precipitation.....				
Trenton, factory.....	Sedimentation, contact beds and sand filters.....	7,000			
Trenton, factory.....	Sedimentation and contact beds.....	25,000			
Trenton, R. R. shops.....	Sedimentation and sand filters.....	10,000			
Trenton, I. O. O. F. home.....	Sedimentation and sand filters.....				
Trenton, city hospital.....	Sedimentation.....				
Trenton, institution.....	Sedimentation and sub-surface irrigation.....				
Verona, institution.....	Sedimentation and sub-surface irrigation.....	7,500			
Vineland, institution.....	Sedimentation and broad irrigation.....				
Woodstown, creamery.....	Sedimentation and sprinkling filters.....	700			
Wortendyke, factory.....	Sand filters.....	40,000			

*Information from source other than State Board of Health. p Population served.

SEWAGE TREATMENT PLANTS IN THE UNITED STATES. INSTITUTIONAL AND PRIVATE.—Continued.

Institutions or private parties operating sewage treatment plants.	General description of plant.	Amount of sewage treated, gallons per day.
New York—(Continued)		
Upper Nyack, benevolent home	Settling tank, sterilization, dosing tank and sand filters	
Valatie, reformatory, Cesspool	and subsurface irrigation.	
Valhalla, benevolent home	Septic tank, contact bed and sand filters	
Wampsville, jail	Septic tank and sand filter	
Webb, hotel	Settling tank	
White Plains, hotel	Sedimentation tanks, sand filters and sterilization.	
Willard, hospital	Settling tank dosing chamber, sprinkling filters, supplementary settling tanks, sterilization plants and sludge bed	
Williamsville, benevolent home	Sedimentation and sub-surface irrigation.	
Yonkers	Settling tanks and coarse grain filters.	
Yorkville	Septic tank	
Ohio		
Alliance, benevolent home	Intermittent sand filtration	
Amherst, quarry company	Sedimentation and coarse grain filtration	
Bucyrus, hospital	Intermittent sand filtration	
Camp Perry	Intermittent sand filtration	
Circleville, hospital	Sedimentation and intermittent sand filtration.	
Cleveland, Camp Wise	Sedimentation and intermittent sand filtration.	
College Hill, benevolent home	Sedimentation, sprinkling filters and intermittent sand filtration	
Collinwood, railway	Sedimentation and contact filtration.	
Dayton, hospital	Intermittent sand filtration	
Delaware, benevolent home	Sedimentation, sprinkling filters, secondary sedimentation and intermittent sand filtration.	
Gallipolis, hospitals	Three plants, intermittent sand filtration and sedimentation with intermittent sand filtration.	
Granville, college	Natural land filtration	
Hudson, boys' farm	Sedimentation and intermittent sand filtration.	
Lancaster, industrial school	Intermittent sand filtration	
Lima, hospital	Sedimentation, contact and intermittent sand filtration	
Madison, benevolent home	Sedimentation and intermittent sand filtration.	
Mansfield, reformatory	Sedimentation and intermittent sand filtration.	
Marietta, hospital	Sedimentation	
Massillon, hospital	Intermittent sand filtration	
Morgans, institution	Sedimentation and intermittent sand filtration.	
Mt. Vernon, sanatorium	Sedimentation and intermittent sand filtration.	
New York—(Continued)		
Reynoldsburg, institution	Sedimentation and intermittent sand filtration.	
Sandusky, benevolent home	Sedimentation and intermittent sand filtration.	
Toledo, institution	Intermittent sand filtration	
Wapakoneta, hospital	Sedimentation and intermittent sand filtration.	
Warren, hospital	Sedimentation and coarse grain filtration.	
Warrensburg, tuberculosis colony	Sedimentation and intermittent sand filtration.	
Westerville, benevolent home	Sedimentation and intermittent sand filtration.	
Wilberforce, college	Sedimentation and intermittent sand filtration.	
Wooster, hospital	Sedimentation and intermittent sand filtration.	
Xenia, benevolent homes	Sedimentation and intermittent sand filtration.	
Xenia, hospital	Sedimentation and intermittent sand filtration.	
Zanesville, benevolent home	Sedimentation	
Oregon		
Chemawa, Indian school	Septic tanks and filter beds	
East District Insane Asylum	Septic tanks and filter beds	
State Mute School	Septic tanks and filter beds	
State Tuberculosis sanatorium	Septic tanks and irrigation.	
Rhode Island		
State Sanatorium	Septic tank, sprinkling filters and settling tank.	
Utah		
Saltair, resort	Septic tank	
Salt Lake, penitentiary	Septic tank	
Wandamere, resort	Septic tank	
Virginia		
Catawba, sanatorium	Imhoff tank and trickling filter	20,000
Laurel, industrial school	Imhoff tank and sand filters.	p300
State Farm	Sedimentation tank and sand filters.	10,000
Wisconsin		
*Dane County Poor Farm	Septic tank and filter	
*Mendota, hospital	Septic tank and filter	
*Milwaukee County institutions	Septic tank and filter	
*Northern Hospital	Septic tank and filters	
*Soldiers' Home	Filters	
*Wales, sanatorium	Septic tank and sub-surface irrigation.	

* Information from sources other than State Board of Health.
p Population served.

STATE BOARDS OF HEALTH

Name and Composition of Body Serving in This Capacity—Names and Titles of Chief Officer of Board and of Official in Charge of Its Sanitary Engineering Functions—All the States and Insular Possessions.

State.	Name of Board.	Composition of Board.	Name and Title of Chief Officer.	In Charge of Sanitary Engineering.
Alabama	Board of censors of state medical association, acting as a committee of public health.	10 physicians.	W. H. Sanders, M.D., chairman, Montgomery.	.....
Arizona	Board of health.	Governor, attorney general and a physician.	Governor George W. P. Hunt, president, Phoenix.	.....
Arkansas	Board of health.	7 physicians.	Frank B. Young, M.D., president, Springdale.	.....
California	Board of health.	7 physicians.	Martin Regensberger, M.D., president, San Francisco.	Charles Gilman Hyde, C.E., acting director, Berkeley.
Colorado	Board of health.	5 physicians and others.	3 Sherman Williams, M.D., president.	.....
Connecticut	Board of health.	5 physicians and others.	2 Edward K. Root, M.D., president, Hartford.	.....
Delaware	Board of health.	7 physicians.	William P. Orr, M.D., president, Lewes.	.....
Florida	Board of health.	3 citizens.	F. J. Fearnside, president, Palatka.	.....
Georgia	Board of health.	11 physicians and others.	2 Samuel C. Benedict, M.D., president, Athens.	.....
Hawaii	Territorial board of health.	.....	J. S. B. Pratt, M.D., president.	.....
Idaho	Board of health.	3 physicians, attorney general and state engineer.	W. R. Hamilton, M.D., president, Weiser.	.....
Illinois	Board of health.	6 physicians.	John A. Robinson, M.D., president, Chicago.	.....
Indiana	Board of health.	5 physicians.	T. Henry Davis, M.D., president, Richmond.	R. L. Sackett, sanitary engineer, Lafayette.
Iowa	Board of health.	Governor, secretary, auditor and treasurer of state, 4 physicians and 2 others.	Walter L. Bierring, M.D., president, Des Moines.	Lafayette Higgins, sanitary engineer, Des Moines.
Kansas	Board of health.	10 physicians and an attorney.	O. D. Walker, M.D., president, Salina.	C. A. Haskins, B.S., sanitary engineer, Lawrence.
Kentucky	Board of health.	8 physicians.	John G. South, M.D., president, Frankfort.	E. H. Mark, M.D., state sanitary engineer and chief bureau water analysis, Bowling Green.
Louisiana	Board of health.	6 physicians and other.	1 Oscar Dowling, M.D., president, New Orleans.	J. H. O'Neill, sanitary engineer.
Maine	Board of health.	5 physicians and others.	2 Charles D. Smith, M. D., president, Portland.	.....
Maryland	Board of health.	4 physicians, attorney general and 2 others.	William H. Welch, M.D., president, Baltimore.	Robert B. Morse, chief bureau, sanitary engineering, Baltimore.
Massachusetts	Board of health.	3 physicians and others.	4 Henry P. Walcott, M.D., chairman, Cambridge.	X. H. Goodnough, Boston.
Michigan	Board of health.	6 physicians and other.	1 Victor C. Vaughan, M.D., president, Ann Arbor.	E. D. Rich, C.E., Ann Arbor.
Minnesota	Board of health.	9 physicians.	W. A. Jones, M.D., president, Minneapolis.	F. H. Bass, director engineering division, Minneapolis.
Mississippi	Board of health.	13 physicians.	M. J. Alexander, M.D., president, Tunica.	.....
Missouri	Board of health.	7 physicians.	F. H. Matthews, M.D., president, Liberty.	.....
Montana	Board of health.	5 physicians, governor and attorney general.	D. J. Donohue, M.D., president, Glendive.	.....
Nebraska	Board of health.	Governor, attorney general and superintendent of public instruction.	John H. Morehead, governor, Lincoln.	.....
Nevada	Board of health.	3 physicians.	W. H. Wood, M.D., president, Reno.	.....
New Hampshire	Board of health.	Governor, attorney general, civil engineer and 3 physicians.	Robert Fletcher, C.E., president, Hanover.	.....
New Jersey	Board of health.	2 physicians and others.	4 John H. Capstick, president, Montville.	R. B. Fitz-Randolph, chief bureau of food, drugs, water and sewerage, Trenton.
New Mexico	Board of health.	6 physicians and other.	1 L. G. Rice, M.D., president, Albuquerque.	.....
New York	Public health council.	3 physicians and others.	3 Hermann M. Biggs, M.D., commissioner of health, Albany.	Theodore Horton, chief engineer, division of sanitary engineering, Albany.
North Carolina	Board of health.	8 physicians and other.	1 J. Howell Way, M.D., president, Waynesville.	.....
North Dakota	Board of health.	Attorney general and 2 physicians.	2 Andrew Miller, attorney general, president, Bismarck.	.....

STATE BOARDS OF HEALTH.—(continued)

State.	Name of Board.	Composition of Board.	Name and Title of Chief Officer.	In Charge of Sanitary Engineering
Ohio	Board of health.	3 physicians, attorney general and 4 others.	John W. Hill, C.E., president, Cincinnati.	W. H. Dittoe, director, division of sanitary engineering, Columbus.
Oklahoma .....	.....	.....	J. C. Mahr, M.D., commissioner of health, Oklahoma City.	.....
Oregon	Board of health.	7 physicians.	E. B. Pickel, M.D., president, Medford.	.....
Pennsylvania ...	.....	.....	Samuel G. Dixon, M.D., commissioner of health, Harrisburg.	.....
Philippine Islands .....	.....	.....	Victor G. Heiser, director of health, Manila.	Geo. H. Guerdrum, chief sanitary engineering division, Manila.
Porto Rico.....	Board of health.	5 physicians and others.	3 Francisco del Valle Atiles, M.D., president, San Juan.	.....
Rhode Island....	Board of health.	6 physicians and others.	2 Alexander B. Briggs, M.D., president, Ashaway.	.....
South Carolina..	Board of health.	South Carolina Medical Association, together with the attorney and comptroller generals of the state.	James A. Hayne, M.D., executive health officer, Columbia.	.....
South Dakota...	Board of health.	3 physicians.	W. L. Vercoe, M. D., president, Deadwood.	.....
Tennessee	Board of health.	3 physicians and other.	1 R. E. Fort, M.D., president, Nashville.	.....
Texas	Board of health.	7 physicians.	Ralph Steiner, M.D., president, Austin.	.....
Utah	Board of health.	6 physicians and other.	1 F. S. Bascom, M.D., president, Salt Lake.	.....
Vermont	Board of health.	4 physicians.	Charles S. Caverly, M.D., president, Rutland.	J. W. Votey, C.E., sanitary engineer, Burlington.
Virginia	Board of health.	12 physicians.	W. M. Smith, M.D., president, Alexandria.	H. Richard Messer, C.E., sanitary engineer, Richmond.
Washington	Board of health.	3 physicians and others.	3 E. J. McCaustland, C.E., president, Seattle.	.....
West Virginia...	Board of health.	A physician and others.	11 W. W. Golden, president, Elkins.	.....
Wisconsin	Board of health.	7 physicians.	W. F. Whyte, M.D., president, Watertown.	W. G. Kirchoffer, bureau of sanitary engineering, Madison.
Wyoming	Board of health.	3 physicians.	Herbert T. Harris, M.D., president, Basin.	.....

(Continued from page 896).

which have a very important bearing upon public health. This idea is comparatively new to state legislators, however, and even to some State Boards of Health.

An indication of the continuance of the former idea of the duties of a State Health Board, but also of the gradual appreciation that prevention is one of its most important functions and that prevention is to a large extent an engineering rather than a medical proposition, is seen in the composition of the various state boards. All the members of the State Health Board are physicians in Alabama, Arkansas, California, Delaware, Illinois, Indiana, Kentucky, Minnesota, Mississippi, Missouri, Nevada, Oregon, South Dakota, Texas, Vermont, Virginia, Wisconsin and Wyoming. All are physicians except one, an attorney, in Kansas; except one, the secretary of the board, in Louisiana; except the governor and attorney general in Montana; except the governor and attorney general of public instruction in Nebraska; except a civil engineer in North Carolina; except the governor general in North Dakota; and except the attorney general and controller general in South Carolina. Civil engineers are found as members of the Board in Idaho (state engineer), Iowa, Massachusetts, New Hampshire, New York, North Carolina, Ohio (the president of the Board) and Washington (the president of the Board). A considerable number of the boards, however, have civil engineers among their employees in charge of a bureau or other sub-department of sanitary engineering.

The table on pages 905 and 906 gives the composition of the board of each of the states as to number of physicians and total number; and, also the engineer or other in charge of such sanitary engineering oversight as the board may include in its functions. Pennsylvania has a division of sanitary engineering, but the position was recently made vacant by the resignation of F. H. Snow.

As shown in the table, seventeen other states have similar divisions, bureaus or officials.

INVESTIGATING KANSAS DISPOSAL PLANTS.

Owing to the press of other duties, the engineers of the State Board of Health of Kansas are able to make only periodic inspections of sewage disposal plants in the state, and, since most of these plants are located in small cities varying in size from 2,000 to 20,000 population, they receive practically no attention from the city officials, and many of them, therefore, naturally are operating very ineffectively.

Realizing this condition, the State Board of Health asked the University of Kansas to attempt, through its Department of Industrial Research, a survey of the various plants, most of which have been built within the past ten years; the object being to ascertain, if possible, whether or not the Board has been proceeding along the right lines in its requirements for the types of plants, cost of them, use of the septic tank, or if further disposal is needed than septic tanks or contact filters.

The University decided to make the investigation and has placed the matter in the hands of Grandville R. Jones, its Professor of Sanitary Engineering and consulting engineer of the State Board of Health. The present intention is to equip temporary laboratories in about ten of the cities of the state which have representative plants, to employ one of this year's graduates in sanitary engineering and a graduate student in chemistry and bacteriology as assistants, whose duty it will be to make a circuit of the plants designated, make investigations of the character and quantity of sewage, the operation of the plants, the character and quantity of the diluting water, etc., these investigations to be carried on for twelve months. It is believed that in this way interesting and valuable information will be obtained.

The WEEK'S NEWS

New York State-Made Brick—California and Pennsylvania State Highways—Wood-Block in Newark—The Coming of Summer Water Waste—Electrolysis Survey in Providence—Flood in Boulder, Colo.—Philadelphia Rate Fight—Motorizing the Fire Departments—School for Street Cleaning—Denver Park Improvements.

ROADS AND PAVEMENTS

New York State to Make Brick.

Albany, N. Y.—Tests made with shale obtained from state land near the Elmira reformatory indicate that it can be used for making paving bricks for highways. Samples of the shale were sent to the American Clay Machinery Company to be made into brick. An inspector was present to insure that only the shale from Elmira was used in the test, and watched every operation. Tests of the brick made at the factory showed that it measured up to every requirement. In the "rattler" test it lost only 18.75 per cent., while the highway specifications for commercial brick allow a loss of 24 per cent. It has been decided to employ the inmates of the Elmira reformatory in the construction of the plant itself, and with the \$50,000 placed at his disposal by the Legislature, Commissioner Carlisle expects to build a plant which will operate as effectively and as economically as those of the big private companies. Governor Glynn declared that the substitution of brick for macadam roads would save the state \$146,000,000 in the next 20 years. Plans for the Elmira brick plant now are being made by Commissioner John N. Carlisle. It probably will be in operation this fall. Professor Charles F. Binns of the state school of ceramics at Alfred University will be in active charge of the brickmaking. The plans submitted by Professor Binns call for a daily output of 15,000 brick at Elmira, and the Highway Department is already planning to utilize this output on new roads as fast as it is manufactured.

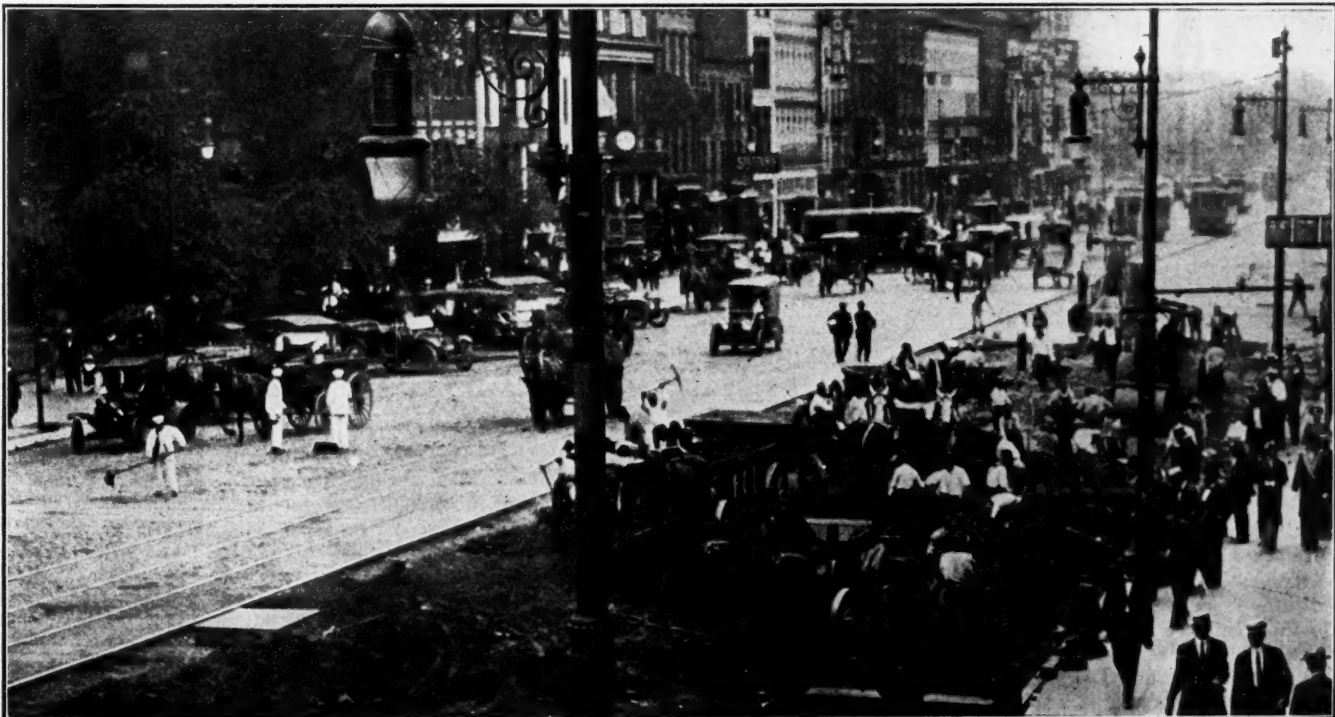
California's 2,536 Miles of Highway.

Sacramento, Cal.—Out of the \$18,000,000 state highway bonds, there has been completed, under the supervision of the State Highway Commission to date, 119 miles of

highly constructed highways, and there is now under construction 392 miles which will be completed within the next five or six months, according to figures announced by State Highway Engineer A. W. Fletcher. This makes a total of 511 miles of new roadways accomplished within less than a two-year period, or since the actual sale of the bonds were begun. The total cost of the highway links, which, when the proposed system is completed, will connect the northern and southern boundaries of the state, and at the same time be interlaced with laterals connecting the counties and county seats, has been, for the completed roads, \$965,566.94, including all the preliminary work for the 119 miles. Thus far a total of \$4,400,358.55 worth of highways have been contracted for, including the \$3,434,791.61 in contracts now active, or representing the roads under construction. There remains to be contracted for an estimated mileage of 2,025 miles, making the entire system to be constructed under the plans laid by the commission 2,536 miles long, or almost as long as across the United States. This grand total, it is expected, will be reached before the lapse of another year and a half or two years of construction. There have been built: Asphaltic macadam, 16.54 miles; asphaltic concrete—the highest type of road in the entire system—12.54 miles; oiled macadam, 19.12; water-bound macadam, 19.48; graded roads, 73.58, and oiled concrete, 369.04. In the far northern sections of the state there soon will be awarded contracts which will almost complete the chain of highways from Sacramento to the Oregon boundary. These contracts also will include laterals connecting various county seats with the main highway.

Wood Block for Newark, N. J.

Newark, N. J.—Rapid progress in laying wood block in Broad street promises relief in the near future from conditions which have tied up that street. 1,500 square yards



Courtesy Newark (N. J.) Evening News.

WOOD BLOCK PAVING IN PROGRESS IN NEWARK.

of wood block laid near Clinton avenue, in Broad street, were the product of the first day's work. There are 75,000 square yards in the whole contract, which would mean a total of fifty days for laying the blocks. Criticism of torn-up streets has been cumulative of late because so many thoroughfares in the center of the city have been made impassable at one time. In Springfield avenue the curb was torn up in the most congested part of the street and traffic impeded by the dangerous conditions at the curb line. The Public Service Electric Company has begun to lay conduits for feed wires there, but that job, though increasing the impatience, is apparently proceeding expeditiously. The wood block laying is under the supervision of Board of Works Commissioner Charles P. Gillen and City Engineer Morris R. Sherrerd. The engineer's inspectors have been instructed in the laying of wood block so that their work is done more effectively.

Auto Fees for Road Repairs.

Harrisburg, Pa.—The constitutionality of the appropriation of income from automobile licenses to the state highway department for maintenance of state highways, has been upheld by Judge McCarrell in the Dauphin county court. He directs Auditor General Powell and State Treasurer Young, to honor a requisition from the highway commissioner against the accumulated automobile income. Two actions are decided by this opinion. In one the auditor general and state treasurer are directed to draw warrants and pay requisition made by Highway Commissioner Bigelow on the accumulations from automobile licenses, which, when the suits were brought, aggregated three quarters of a million dollars and which now amount to over a million. In the other, an action is brought against the auditor general separately. Highway Commissioner Bigelow said that the court had upheld the contentions of his department in every particular and that extensive repair work would now be pushed. Commissioner Bigelow intends to have the state highways gone over thoroughly, repairs made, gutters changed and drains and culverts fixed.

Free Cement for Lincoln Highway.

DeKalb, Ill.—At a meeting of the Illinois Councils of the Lincoln Highway Association held here it was announced that the association would contribute 8,000 barrels of cement to be used in permanently improving the Lincoln Highway in this state. It was decided to divide the known mileage of the highway in the state into four divisions, each to receive 2,000 barrels. The competition for the cement will close July 1, and all work must be completed during the open season of this year. The cement will go to the townships agreeing to do the most permanent concrete road construction. The roads must be at least ten feet wide, with gravel or macadam shoulders.

Rhode Island Towns in Road Inquiry.

Providence, R. I. — Westerly, Middletown and Foster have been selected by the officials of the State Board of Public Roads as the towns in which the general investigation of road building in this state, which is to be made by government experts shortly, will be made. The selection of these towns was made by Irving W. Patterson, chief engineer for the State Board. Patterson has been informed by Director L. W. Page of the Office of Public Roads in Washington that the investigation will be begun soon. According to Mr. Patterson, the towns of Westerly and Middletown were selected because considerable road work has been done by both these towns, and each has a fairly good supply of road material. The town of Foster was chosen because it is a sparsely settled section, and has little funds to spend upon road building or improvements. It is said by the board that the three towns selected will furnish the best possible material for a study of road conditions here. Some time ago officials of the Department of Agriculture at Washington communicated with Chairman Treat of the State Board of Roads, requesting him to select sections of the state in which detailed studies of road building systems could be made by government experts. The data will be compiled as soon as the investigation is completed, and will be at the disposal of the state roads boards which may desire to avail themselves of it.

Baltimore Paving 75 Miles.

Baltimore, Md.—Close to 75 miles of improved pavement will have been laid by the Paving Commission when work now under contract is finished, according to estimates made up at the City Hall. The total cost will aggregate \$3,000,000. When the commission began operations in the summer of 1911 there were 5,000,000 square yards of cobblestones in the streets and alleys of Baltimore. More than 1,000,000 square yards have since disappeared, and in their place are sheet asphalt, granite blocks and vitrified blocks. To date the expenditures from the \$5,000,000 loan amount to \$2,500,000. An additional \$500,000 will have been spent or put under contract before the end of the year. The entire city will be paved within the original estimate of 10 years and also within the estimated cost of \$10,000,000. This, the engineers say, is certain from the amount of work already done and its cost. The special paving tax, that is to supply half the funds, or \$5,000,000, will run for 20 years from the beginning of the work, or for 10 years after the last street shall have been paved.

To Build Two Test Roads.

Trenton, N. J.—The Road Committee of the Board of Freeholders has decided to build half of the White Horse road with concrete, as an experiment. The other half will be built with bituminous concrete, and the work will be done by contract. By dividing the road in two parts the Freeholders will be able to compare the exact cost of building roads with concrete with that of other materials, and also to determine the wearing qualities. Should the experiment with concrete prove a success it is likely that all roads in the future will be built by the county employees with the mixture. It was decided to improve the White Horse and Allentown-Yardville roads with "Bindite."

Boulevarding Berkeley Streets.

Berkeley, Cal.—The sum of \$82,055 is now being expended by the City Council in the improvement of various avenues and thoroughfares in Berkeley in the general plan to prepare for the rapid growth which is expected within the next few years, and within six weeks work on Sacramento street boulevard will be commenced. When completed, Sacramento street will be 110 feet wide, with a sidewalk area of 12 feet on either side. A central area, 30 feet wide, will be parked. In line with the improvements planned by the city, the Key Route system will double track its line in Sacramento street.

New Road Graders Accepted.

St. Cloud, Minn.—The Adams angle wheel road graders just purchased by Stearns County for building and maintaining good roads have been found satisfactory in the tests. After the graders were put into operation behind the steam traction engine the work advanced rapidly, and a roadway 32 feet in width, with a good curvature, was started. The arrangement of the graders was such that the first grader followed in the track of the steam engine, and the second machine was out to the side of the road. A large quantity of dirt was removed and the road graded at a rate of about a mile per day. The machines, which were made by F. D. Adams & Co., Indianapolis, Ind., were accepted.

WATER SUPPLY

Issue Warnings of Water Waste.

Greensboro, N. C.—Commissioner J. Giles Foushee says the people of Greensboro are using an excessive amount of water by a million or more gallons per day. Every day since the first of June the people have used 2,500,000 gallons. There is plenty of water, Mr. Foushee says, but it cannot be filtered quickly enough. Two new filters have just been put in, but they are not sufficient to supply the amount that the Greensboro people have been using. It is contended that 1,250,000 gallons should be enough for the people of Greensboro. This would allow to each person 40 gallons on an average. If properly handled, this amount of water is considered by Captain Foushee as sufficient. The trouble is neither with the lack of water, nor

with the inability to pump it fast enough. Each of the two pumps has a capacity of pumping 2,500,000 gallons of water—far more, says the Commissioner of Public Safety, than is required. Many people let their hydrants run longer than the period allowed by law—two hours per day. Many are said to run day in and day out and through the night without being cut off. Mr. Foushee asks that the people keep within the limit.

Newcastle, Ind.—Superintendent Younce of the city water works has announced that the rules for sprinkling and other uses of water will have to be enforced, as the drain on the reservoirs has reached the point where it is dangerous, and in case of a big fire the water supply would soon be exhausted, and a great loss would very likely result. During the past few days the plant has pumped about 2,000,000 gallons daily, and during the sprinkling hours close to 2,000 gallons per minute have been pumped. In South Bend, Muncie and other cities the sprinkling has been reduced to two hours each day, as a measure to save water. An investigation has been conducted by Superintendent Younce and his assistants during the past few days, and several instances of rank violation of the water rules have been found, and several consumers have been summarily cut off and have had to pay a fee to have their water reconnected. It has also been found that several use the hose to keep truck gardens watered. This use is provided for under the water rules, but the consumer is required to pay extra for the service. The rules allow sprinkling only from 5 to 9 in the morning and evening, and for a total time of not more than four hours a day on unmetered services. All hydrants and faucets must be shut off on the alarm of fire.

Altoona, Pa.—According to Director H. T. Cornman of the Department of Public Property, Altoona is not likely to be troubled with a shortage in the water supply if there is the usual rainfall throughout the summer, and if the people will be reasonable in the amount they use. The officials of the bureau believe that many people are wasting the water, for the consumption is much larger than it should be under ordinary conditions, and it is with difficulty that the distributing basins on Prospect Hill and at Oakton are kept filled. Until the new twin reservoirs on Prospect Hill can be completed, which will not be before the close of 1915, it will not be possible to bring to the city as much water as might be desired.

Chicago, Ill.—In a communication to the City Council, Mayor Harrison denounced Chicago's waste of water as a "municipal crime." The mayor urged the Council to bring about the installation of water meters as a means of conserving the water supply, and placing rates on a more equitable basis. He said it was the duty of the city authorities to adopt immediate means to reduce the waste and by this reduction to better the service given the average citizen. Mayor Harrison said that the city pumps millions and millions of gallons of water which is of benefit to no one, and yet each year during the hot season many householders are unable to get an adequate supply.

Plan Electrolysis Survey.

Providence, R. I.—An electrolysis survey of the entire city, to determine the damage being done to water and gas mains and other underground systems by this agency, will be started within a few days by the Rhode Island Company, City Engineer Clapp and Public Service Engineer Brunet. The survey will cover practically every street in the city and will include an examination of water and gas mains, telephone and electric conduits, electric car tracks and other systems which are affected by electrolysis. In the past this electrical action has caused considerable damage to underground systems, the strength of iron water and gas pipes being so weakened by pitting until in some cases the pipes have become so thin as to be unable to withstand the pressure and have burst. It is said now, however, that the amount of electrolysis damage is comparatively small.

Proposes Study of Water Supply Extension.

Philadelphia, Pa.—Drawing attention to the fast approaching time, five to ten years off, he puts it, when the present water system of Philadelphia will be inadequate to meet the demands upon it, Director M. L. Cooke, of the Department of Public Works, has sent a letter to John P. Connelly, chairman of Councils' Finance Committee, pointing out the necessity for an expert examination of the plants so that definite plans for supplying the future needs of the city may be arrived at. Director Cooke suggested in his communication that Councils set aside \$15,000 for the payment of experts to make the study recommended. In an interview he declared himself in favor of employing one man at a time and receiving his report rather than the appointment of a commission to do the work.

Facing Water Famine.

Connersville, Ind.—Connersville is facing a water famine. The four pumps at the water works are pumping only 700,000 gallons of water a day. The city normally uses more than a million gallons. All sprinkling has been forbidden. The city changed to a deep well system four years ago, abandoning the old White Water Valley Canal, which supplied an unlimited quantity of water, which, however, was warm in summer and unfit for drinking purposes at all times. The water works has cost more than \$60,000 since the change, and the latest expedient, that of large wells, worked by air lift pump, is not in operation. The first of the new wells, 12 inches in diameter, has been sunk and the air lift has just been attached.

To Start Work on Basin.

Altoona, Pa.—C. W. Knight, of Rome, N. Y., consulting engineer of the Altoona Water Bureau, who prepared the plans for the new reservoir on Prospect Hill, has gone over the site of the new reservoir, where operations will be started immediately. Mr. Knight has prepared the plans for all the reservoirs of the Altoona water system except the Kittanning Point basin, which was constructed many years ago and they are all in good condition. The engineering work in connection with the new reservoir is in such shape that Mr. Knight will not need to come here more than once or twice while the work is being done.

City Loses Water Suit.

Revere, Mass.—The suit brought by the town of Revere to rescind its purchase of the plant of the Revere Water Company for \$360,000, originally brought in 1904, has been lost, the full bench of the Supreme Court handing down a decision affirming a ruling of a single justice. The town charged that Albert S. Burnham, director and superintendent of the water company in 1904, had himself elected moderator of the town meeting, and as such had the practical selection of the members of the committee chosen to arrange for the sale of the plant. The town maintained that it had been defrauded out of \$150,000 to \$200,000 by the sale, claiming that the property had been reported to the committee in charge of the sale as of much greater value than it really was.

Water Service Improved.

Perth Amboy, N. J.—The residents of the northwestern section of the city are receiving a good supply of water now since the repairing of the old twenty-four inch main in the Raritan River by the Merritt-Chapman Derrick & Wrecking Company. The pressure, shown by the meter at City Hall has risen from its usual mark around thirty pounds in the evening when the manufacturers are not making heavy drafts on the mains, to around fifty pounds. According to Superintendent Thomas Grieve, of the water department, the repairing of the twenty-four inch main has meant a saving of about a million gallons of water a day that was flowing out of the leaks in the line into the river. Though the two twenty-four inch mains were inspected last fall by divers, a number of leaks were found, one of which let out an enormous amount of water. The leaks were mostly around the joints of the main. The twenty-four inch main, which was laid in the last few years, was not found to be defective, the leaks being confined to the original twenty-four inch conduit.

Flood Washes Out Boulder Water System.

Boulder, Colo.—The recent heavy rains caused the washing out of the 12-foot Park reservoir earth dam, loosing eight million cubic feet of water, which poured down Boulder Creek in a roaring torrent, sweeping everything before it. The most serious damage was done to the water system of the city of Boulder. Hundreds of feet of pipe line were washed out, and the city was made dependent upon the small supply in the Sunshine and Chautauqua reservoirs. The city was face to face with a serious water famine, the Chautauqua reservoir becoming exhausted. Many canon bridges were washed out, and bridges all along the stream were weakened. Sidewalks and approaches were wrecked. Rural districts east of town were badly flooded. A district three miles wide was under water in the vicinity of Valmont. The water pouring over the spillway at Silver Lake dam had increased from 115 feet per second to 260 feet. The dam is 20 years old, and officials say the structure was weakened two years ago by excavations for a new dam. Men were rushed to aid in strengthening the structure. Reports from Goose Lake, Albion Lake and Island Lake, all west of Silver Lake, stated that those reservoirs have reached capacity. The state highway between Longmont and Lafayette is under water for a distance of a half mile on either side of the main bridge. Large sections of the county road from Boulder to Denver are under water. Unless there are further heavy rains in the hills there is little danger that more damage will be done. Neither city nor county officials have attempted to estimate the extent of the damage, but all express the opinion that it will run into many thousands of dollars.

Install 600 Valves.

Lebanon, Pa.—After four years' work, the city water department has completed one of the biggest projects it has ever attempted—the installation of nearly 600 valves at the city street intersections, by Superintendent E. H. Shroff. The completion of the system will prove a great convenience to residents. Where there is leakage in a main it will not be necessary to shut off the water for eight or ten blocks, but will necessitate only the shutting off of water in one block. The fire protection is greater because in case of a break in a main it means only the shutting off of the supply in one block, and it will not require more than 400 feet of hose to reach from the next intersection.

Do Not Want Metropolitan Water District.

Oakland, Cal.—The proposition to form a metropolitan water district, based upon the successful Boston plan, has been defeated by the voters of Oakland, Berkeley, Alameda, Piedmont, Emeryville, Albany, San Leandro and the unincorporated districts of Mt. Eden; Ocean View, San Lorenzo, Alvarado and a portion of Western Hayward, by a majority of 2,592 votes. Only 24,570 voters out of a total registration of 88,044 cast their ballots in the election. Three communities approved of the project, carrying it by substantial majorities. These were the cities of Berkeley, Piedmont and Emeryville. Another important feature of the proposed measure is the adjustment of taxation in case of secession, annexation or consolidation. It is provided that each original unit of any city and county government shall be under the borough system of administration and shall be taxed separately in proportion to the rate of taxation which existed when they were separate communities. In other words, the prevailing rate of taxation in Oakland could not be applied to Berkeley, Alameda, Emeryville or any other city or town that joined with it in a city and county government. Taxation would be pro-rated to each borough of the city and county government on the basis of its individual needs. This is the system in vogue in Seattle, where it is working out to the satisfaction of all interests. It does away with the possibility of saddling upon any district annexed or consolidated taxation which would relieve any other subdivision of its burden of expense.

Expert to Inspect Reservoir.

Nashville, Tenn.—On the completion of the cleaning up of the west basin of the city reservoir, Robert Elliott, commissioner of the Water Works Department, will engage Rudolph Hering, hydraulic engineer of New York, to come here and inspect the basin and recommend such measures as he may deem advisable for the purpose of insuring its safety. Mr. Hering is the hydraulic engineer who was consulted by the Board of Public Works after the wall of the east basin broke, and it was in accordance with plans and specifications prepared by him that the wall was repaired and the interior of the basin treated. Mr. Hering was also consulted in regard to the west basin, which he recommended be treated in the same manner as the east. Since the cleaning of the basin was begun, extraordinarily rapid progress has been made in removing the sediment from it, the work being pushed day and night. The force employed in the work is divided into three shifts, one of which consists of city prisoners, who are kept on the reservoir premises, the building recently erected for the storage of sulphate of aluminum and other purposes affording them shelter. The money to be used in defraying the expense of waterproofing the basin is part of a fund derived from the sale of \$150,000 of bonds, about \$90,000 of which was expended in repairing and treating the east basin.

Lower Rates in Competition Not Discriminatory.

Bethlehem, Pa.—The complaint of two consumers against the Bethlehem City Water Company, in which discriminatory rates were alleged, has been dismissed by the Public Service Commission. It was alleged that the water company charges two different rates for the same service in the same borough; that on streets in West Bethlehem, where service is furnished by the plant of the borough of Bethlehem, the water company allows 40 per cent. discount, and that on other streets a discount of only 25 per cent. is granted. In 1913 the borough extended its water to West Bethlehem and proposed to supply water on some of the streets at rates lower than those of the water company. The latter, in order to meet the competition, makes the additional discount of 15 per cent. for prompt payment to consumers along the streets occupied by its competitor. The contention was that the additional discount of 15 per cent. for prompt payment allowed to consumers on one street, and not to those on another only a square away, constituted a discrimination within the prohibition of the public service company law.

STREET LIGHTING AND POWER

Philadelphia's Fight for Lower Rates.

Philadelphia, Pa.—It is the purpose of the Blankenburg administration to obtain cheaper electric current for domestic and commercial use, either by forcing the Philadelphia Electric Company to reduce its rates or by inducing the public service commission to grant permission to competing concerns to enter the Philadelphia territory.

Heretofore the efforts of the city government have been confined to reducing the cost of street lighting. Director Cooke, of the department of public works, has now announced that Mayor Blankenburg had instructed him to request a review of the private rate schedule of the Philadelphia Electric Company at the same time the city presents its demands to the commission for a reduction in the charge for public lighting. Director Cooke asks for an appropriation of \$5,000 for the payment of experts to help prepare the city's case for presentation to the public service commission. It will only require a reduction of less than one-half of 1 per cent in the public lighting rates to warrant the expenditure, says Director Cooke.

For months past the employees of the Bureau of Electricity, Gas and Lighting have been gathering material. The proper preparation of the case will involve securing cost data on every phase of the electric lighting industry. Much of this data is so closely guarded by private corporations as to be very difficult to obtain. It will also be necessary for the city's representatives to have all the

facts with regard to the valuation of the plant of the Philadelphia Electric Company, its various issues of securities, its operating efficiency and policy. If the precedents of the commissions in other states are followed, the commission will be principally interested in determining a fair price for electric current manufactured and delivered in Philadelphia, either by the Philadelphia Electric Company or a competitor. Preparatory to the battle with the Philadelphia Electric Company, Director Cooke has engaged Dr. Clyde L. King, instructor in political sciences at the University of Pennsylvania, as an investigator and adviser in future negotiations. Proposals for the 1915 street lighting contract will be invited in a few days. The city is now paying about \$1,200,000 a year for its electric street lighting. The 1915 contract will be reviewed by the Public Service Commission, and if the Philadelphia Electric Company fails to make a satisfactory rate the city will have an opportunity to bring a contest before the commission. Dr. King will not only have general supervision of the negotiations for the 1915 contract, but he will prepare the city's case if it becomes necessary to carry the fight before the Public Utilities Commission.

Successful Light Plant.

Hagerstown, Md.—According to the annual report of the Street Commissioners, under whose direction the municipal electric line plant is operated, the net earnings for last year were \$11,672.90, after deducting \$13,834.45 for depreciation. The receipts were \$68,700. The operating expenses were \$43,192.65 and \$21,544.66 was spent for improvements. The present value of the plant is \$146,054.79. Since 1910 the Mayor and Council have made no levy for the plant, the receipts paying all maturing bonds, bond interest, operating expenses and for improvements. J. Oscar Beard is superintendent.

FIRE AND POLICE

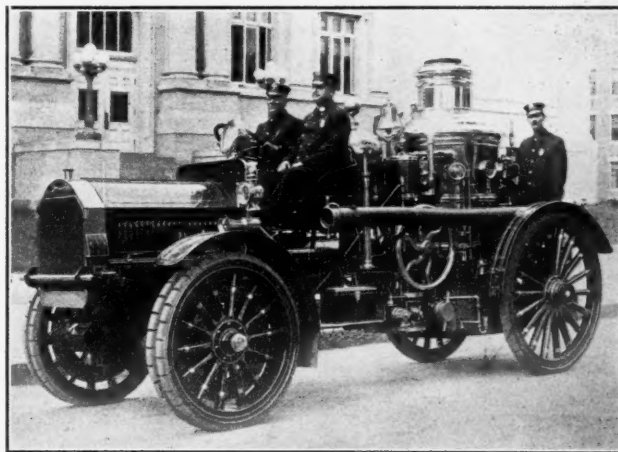
Bridge Burned.

Somerville, Mass.—The Wellington bridge, which spans the Mystic river between Somerville and Medford, was so burned that it will be early fall before it will be fully repaired and opened for traffic. Nearly 500 feet of the structure, which is 900 feet long, was destroyed from the Medford to beyond the steel drawbridge, and the latter was so warped by the fire that it fell apart and dropped into the river. For more than three hours the firemen of Medford, Somerville and Everett fought the flames before they were able to place the fire under control, and it was not until high tide, when Boston fire boats were able to steam up the river that an effective stream of water were turned on it. The hydrant nearest to the bridge is a quarter of a mile away. Handicapped by lack of water, the combined fire fighting forces laid their hose along the bridge, being obliged to retreat as the flames, almost unhampered by the puny streams, spread toward them. Two hydrants, one on the Somerville side, the other in Medford, were the only source of available water supply. Fireboats which were summoned from Boston were unable to get any nearer than the West Somerville bridge on account of tidal conditions and low water also permitted the wind to sweep under the structure, the flooring of which acting as a grate. So intense was the heat the steel girders of the drawbridge crumpled, and the draw sagged and finally dropped into the river. The bridge was constructed about eight years ago. The only cause advanced for the origin is defective feed wires, which furnish light to the draw-keeper's house. The loss is estimated at \$100,000, but this is considered a trifle compared to the interruption of travel between Somerville, Medford and Boston.

Asked to Pay for Extinguishing Fire.

New York, N. Y.—The right of the Fire Department to collect from property owners who have neglected to comply with orders of the Fire Prevention Bureau the cost of extinguishing fires occurring in consequence of such neglect, is being argued before Justice Giegerich in Special Term, Supreme Court. The Fire Department is suing the Greenwood Cemetery Corporation for \$1,500,

the cost of calling out the apparatus for a fire in the basement of a building owned by the corporation on January 31 this year. The Fire Prevention Bureau on November 19, 1913, had ordered the installation of automatic sprinklers in this building. This suit was based on a long forgotten provision of the Charter, which provides that a property owner is liable for the cost of extinguishing the fire and for injuries to firemen when a fire occurs through the failure of the property owner to comply with an ordinance of the Fire Department. If the right of the Fire Department to collect costs in such cases is established, scores of suits will be started against property owners for fires in buildings which have not been protected in accordance with the orders of the Fire Prevention Bureau.



Courtesy Lynn (Mass.) Daily Item.

LYNN'S NEW MOTORIZED ENGINE.

Chemical Engines Stop Most Fires.

Sacramento, Cal.—Between eighty-five and ninety-five per cent of the fires in Sacramento are controlled by chemical engines, according to Fire Chief C. W. Anderson, and that is the reason he has recommended the purchase of a new motor-driven chemical engine by the city. Anderson will recommend that some of the chemicals in Sacramento be equipped with "booster" engines to throw the liquid. When the city gets the apparatus, bids for which have been asked, the Fire Department will have four chemical engines, all motor driven; one combination ladder and chemical machine and four combination hose and chemical machines.

Opposes Private Fire Alarm.

New York, N. Y.—When the question of granting a franchise to the Manhattan Fire Alarm Company came up before the Board of Estimate, a letter from Fire Commissioner Adamson advising against the proposal and requesting that the city buy up the company's plant to increase the efficiency of its own, was read. Mayor Mitchel said that the Board would not think of granting a franchise while considering the purchase of the property. Commissioner Adamson's opinion is that the control of the city's fire alarm system should be in the hands of the city and he is opposed to granting a private concern a twenty-four year franchise to run a public service as a commercial enterprise. The company has no franchise and the license it holds is revokable by the Fire Commissioner. If it is allowed to operate it is likely to interfere with the city's fire alarm telegraph system.

MOTOR VEHICLES

Lynn Fire Engine Motorized.

Lynn, Mass.—The Broad Street Engine House now contains all motor-driven apparatus. The last apparatus to be motorized was Engine 4 which has now been in commission for some time. The engine is capable of 25 miles an hour. She is of the Amoskeag style, first type and will throw 1,000 gallons a minute. The tractor is an A. & B. machine, made by the American & British Mfg. Co., Providence, R. I.

New Aerial for Akron.

Akron, O.—The 85-foot aerial truck recently delivered to the City of Akron, Ohio, by James Boyd & Bro., Inc., Philadelphia, Pa., has been accepted formally by the city. The acceptance test was run before Mayor Frank Rockwell, Director of Public Safety Daniel Stein and Chief of the Fire Department John T. Mertz. On one of the longest hills in Akron, three quarters of a mile long from eight to ten per cent grade, the truck made an average speed of twelve miles an hour. A fourteen per cent grade was negotiated at a speed of eight miles per hour. On the level the truck maintained a speed of twenty-five miles an hour. The ladder was raised and laid against each of three buildings in an average time of twelve seconds. The entire test was conducted without a hitch, and the city officials declared they were more than pleased with the results. The truck is straight battery drive and is equipped with solid tires. Among the guests from out of town who witnessed the tests were the Mayor and Chief of the Fire Department from Lorraine, Ohio; Cleveland, Ohio, and Barberton, Ohio.

Altoona to Test First Auto Engine.

Altoona, Pa.—Altoona is testing the operation of a motor-driven engine, the first to make its appearance in the city. Workmen at the machine shop of the Altoona car shops are busily engaged in assembling the engine parts and attaching them to the new chassis which has arrived from the White factory in Cleveland. Much interest has been aroused in the motor-driven engine, and firemen throughout the city are eagerly awaiting the preliminary tests of the vehicle, which will be made following its completion at the Pennsylvania Railroad shops. This newest acquisition in motorized equipment will be stationed at No. 8 fire house, which is maintained by the Pennsylvania Railroad.

Police Autos for Louisville.

Louisville, Ky.—The Louisville Police Department is finding ever-increasing work for the automobile. It has just received two 1914 Cadillacs, one a touring car for the use of the chief, and the other a chassis on which a patrol wagon body is to be mounted. The Police Department has had Cadillacs in service in its various branches several years and all are giving good economical service.

New Auto Engine Passes Test.

El Paso, Tex.—The American-La France triple combination auto fire engine, in an official test, has more than met the requirements of the city's contract. The contract only calls for 700 gallons of water per minute, while the engine at one time was pumping 1,005 gallons out of three separate lines of hose. The size of the nozzles was $1\frac{1}{8}$ inch. The lowest figure was 815 gallons and that was when the engine was pumping water through three lines and out of $1\frac{1}{8}$ inch nozzles. One thousand gallons a minute was poured out of three lines connected to a 2 inch nozzle on the central auto engine. Out of a $1\frac{3}{4}$ inch nozzle with the three lines connected, 865 gallons a minute were pumped. The new engine threw a stream of water through a $1\frac{1}{4}$ inch nozzle 175 feet in the air. In this test 518 gallons a minute were being pumped. Mayor C. E. Kelly and Aldermen J. I. Hewitt, Ben Levy, W. S. Clayton and C. H. Leavell attended the test, superintended by Chief Armstrong.

GOVERNMENT AND FINANCE

City Managers' Conference.

Springfield, O.—City Manager Charles E. Ashburner has mailed invitations to the 13 city managers in as many commission form of government cities asking that the first convention of the city managers of the United States be held in Springfield August 4, 5 and 6. Invitations were mailed to the following city managers: William F. Robertson, Sumpter, S. C.; John Mitchell, Hickory, N. C.; R. W. Pipkin, Morgantown, N. C.; Henry M. Waite, Dayton, O.; F. J. Lasky, Le Grande, Ore.; Ossian A. Carr, Cadillac, Mich.; William A. Farish, Felix, Ariz.; S. A.

Sieberts, Morris, Minn.; M. H. Hardin, Amarillo, Tex.; D. W. Pinkerton, Montrose, Colo.; Kenyon Riddle, Abilene, Kan.; S. D. Holsinger, Staunton, Va.

A Municipal Boosting Board.

Amarillo, Texas.—Amarillo has substituted a municipal Board of Civic Development for the voluntary Chamber of Commerce or Commercial Club on which most towns depend for their development. A tax of two mills on the dollar provides for the board's activities a sum of about \$18,000 a year, which is spent in the work of raising the standard of civic conditions and giving the town publicity. Under this system every taxpayer of the city contributes to the work which would otherwise be done by a commercial club, and the advantage of the Amarillo plan is shown by the fact that a number of the largest property owners are non-residents who might be difficult to interest in voluntary contributions to a chamber of commerce. Amarillo is under the commission form of government and has a city manager, and, according to Mayor J. N. Beasley, the workings of the system have so far been excellent.

Appoint Town Manager.

Osage City, Kan.—The Mayor and City Council of Osage City have passed an ordinance whereby a city manager can be employed to have full charge of the public utilities of the city, which include an electric lighting system, water works and other improvements valued at \$250,000. Mayor Murphey has appointed D. W. Ellis, civil engineer, with a salary of \$125 per month.



Courtesy Brooklyn (N. Y.) Daily Eagle.

ORNAMENTAL PILLARS FOR ELEVATED RAILROAD.

City's Against State's Speed Laws.

Salem, Ore.—That a municipality virtually is a sovereign and is free from molestation by the Legislature in home affairs was the gist of a Supreme Court ruling in an automobile accident damage case for \$35,000 which brought up the question of whether state speed laws or city ordinance speed limits applied. The lower court had held the city ordinance could not be introduced, and the defendant won. The Supreme Court, in reversing the lower court, holds that the Legislature cannot be specific in interfering with affairs germane to municipalities, allowing, however, that the Legislature may pass a general law affecting a city charter or ordinance which concerns the state in its sovereign capacity.

STREET CLEANING AND REFUSE DISPOSAL

School for Street Cleaning.

New York, N. Y.—Scientific street cleaning is to be taught the sweepers of New York City. Commissioner J. T. Fetherston has announced plans for the establishment of a school of instruction, which in many respects will be similar to the schools of instruction maintained by the fire and police departments. This school, Commissioner Fetherston believes, will do away with many of the slipshod methods hitherto in vogue, and establish a definite standard of efficiency for every man in the department, regardless of whether he be an officer or sweeper. As

part of this efficiency movement, certain standard rules and regulations will be laid down, which will apply to any condition or contingency in the work of the department. A. A. Taylor, district inspector of the Borough of Brooklyn, and snow inspector for the Greater City, has been placed in charge of the school project. He has appointed 21 committees to investigate the various phases of the street cleaning work and to ascertain, as far as possible, the best manner of handling it. Heretofore there has been little or no systematic preparation for duty in the Street Cleaning Department. In that department a man might apply for the position of driver, for instance, and, without investigation, would be placed by the department in charge of one of its wagons. No further steps were taken to determine whether he was capable or incapable, whether he knew how to handle a horse and care for one, and what he knew about the rules of the road. The 21 committees which have been appointed to investigate the various branches of the service, with a view to making reports which will be of use in organizing the school, are as follows: Feeding and care of horses, care of harness, maintenance of equipment, sweeping by hand and by machine, flushing of streets, removal of refuse, classification of refuse and ashes, and the teaching and enforcement of city ordinances, with their proper explanation to the public. The reports of these committees will be bound in book form and will be filed as reference and rule books by the department. This is one of the first ideas of the new commissioner that will be put into effect. It is regarded as meaning a thorough reorganization of the department.

Dayton to Bury Garbage.

Dayton, O.—Owing to the refusal of one of the railway companies to construct a spur as had been anticipated, City Manager Waite's proposed plan for the disposal of the garbage cannot be put into execution as early as had been anticipated. However, it is expected that this obstacle will be removed and relief provided for the people in the East End, who insist that the situation out there is unbearable, within the near future. Discussing his communication to the city commission. City Manager Waite explained that his plan contemplated burying the garbage. Some time ago the reduction company notified the city that, due to the condition of the plant and the expiration of their contract, if the city desired to have the garbage taken care of it would be necessary for it to allow them at the rate of \$500 per month to cover necessary repairs to their plant to keep it in condition to handle the city's garbage. Recently the company notified the city that the condition of their plant was such that they could operate but a few days longer if repairs were not immediately made. The city does not feel it should go to any expense for the repairs of their plant, and it will make arrangements to handle the garbage temporarily until permanent plans can be agreed upon.

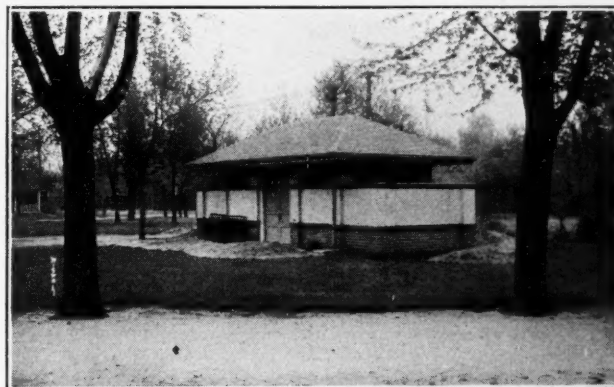
RAPID TRANSIT

A 14-Million Dollar Contract.

New York, N. Y.—The Public Service Commissioner for the First District has just awarded rapid transit contracts aggregating more than \$14,200,000. The largest single contract given for such work since the \$35,000,000 contract awarded for the construction of the present system was among the number. This was the contract for the construction of the two tunnels under the East River from downtown Manhattan to Brooklyn to Booth and Flinn, Ltd., and the O'Rourke Engineering Construction Company, on their joint bid of \$12,444,725.75. The contract requires the completion of the work within three and a half years from the delivery of the contract, and provides a penalty of \$1,000 a day for each day beyond that limit. The contractors must give a bond of \$500,000 for each tunnel. The other contract awarded during the week was that for the construction of another section to the Underpinning and Foundation Company, the lowest bidder, for \$1,822,994.25. Both these subways will be operated by the New York Municipal Railway Corporation.

Ornamental "L" for Brooklyn.

Brooklyn, N. Y.—Progress on the ornamental elevated railroad in the Queens Boulevard section is rapid. The reinforced concrete piers are now in place and the forms taken off. The illustration shows the present stage of the work.



Courtesy "City of Denver," Denver, Colo.
DENVER'S NEW COMFORT STATION.

Seattle's Municipal Trolley Line.

Seattle, Wash.—Operation of the first division of Seattle's municipal street car system has begun. The line extends from the business part of the city to Ballard, a manufacturing district four miles south. Twenty-five tickets are sold for \$1.00, but the ordinary fare is five cents. The city is negotiating for the purchase of the Seattle, Renton & Southern Railroad, which connects with the line now opened.

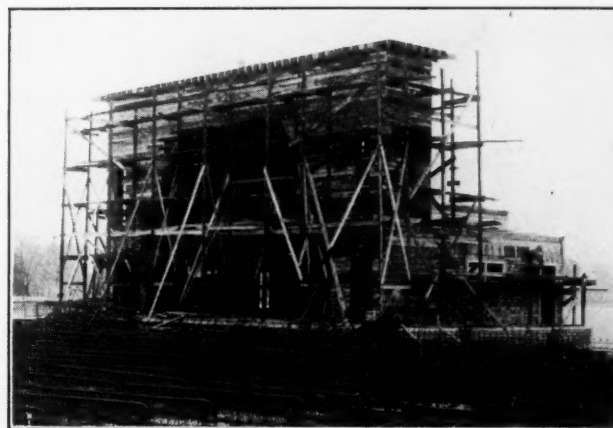
MISCELLANEOUS

Denver Park Improvements.

Denver, Colo.—Denver is engaged in a city-wide campaign of park improvements. Among these is the construction of several roads. There will be new shelter stations and open fireplaces. Mr. Frederick Law Olmsted's plans for the civic center will be carried out as far as possible. Many new drinking water systems will be installed. In City Park a new band stand is being built to replace the worn one and will hold a fifty-piece band during the summer. In Curtis Park a new comfort station has just been completed. The illustrations show the last two improvements mentioned.

Kansas City Wins Billboard Fight.

Kansas City, Kans.—All billboards in Kansas City in violation of the "twelve feet back" law must go. The City Councillor received word of the final dismissal of the appeal of the Kansas City Billboard Company in the United States District Court. The fight covered a period of three years. It is estimated there are more than 300 billboards here in violation of the ordinance.



Courtesy "City of Denver," Denver, Colo.
WORK ON DENVER'S NEW BAND STAND.

LEGAL NEWS

A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

Construction of Contract—Personality of Engineer.

City of Ironton (Ohio) v. Harrison Const. Co.—Where a city's contract for the construction of waterworks gave to the city engineer in charge of the works broad powers, authorizing him to supervise the work of construction generally, to order additional work, fix the price therefor, and determine controversies, etc., a provision that the word "engineer," as used in the contract and specifications, referred to P., chief engineer, in charge of the work, or in case of his death or disability, such other person as might be appointed by the city or the engineer entitled the contractor to the services of P. as engineer in charge of the work, except in case of his death or disability.—Circuit Court of Appeals, 212 F. R. 353.

Eminent Domain—Right to Compensation—Fixtures.

In re Postoffice Site in Borough of the Bronx, N. Y.—Where an engraving plant was located on premises condemned, the owner was entitled to compensation for a motor bolted to a platform about seven feet above the floor bolted through two walls with a heavy wooden column supporting the corner of it, a lathe weighting 3,500 pounds fastened to three concrete pillars resting upon the ground and built up through the floor, a special cylinder router weighing 300 pounds resting upon the floor and supported by two extra beams specially put under the floor to carry its weight and bolted through the floor into the beams, which machine was specially constructed for the building, a lathe milling machine weighing 800 pounds and bolted to the floor and fastened overhead to the ceiling, and a planer milling machine weighing 700 pounds built into the floor with angle irons bracing it, since in condemnation proceedings the rule as to fixtures is that which applies between vendor and vendee, and not the rule applying between landlord and tenant, and if the owner could not resume business in some other location with profit they should not be left with useless machinery on their hands.—Circuit Court of Appeals, 210 F. R. 832.

Constitutional Law—Due Process of Law—Imposing Special Penalty of Railroad.

Chicago, Milwaukee & St. Paul R. R. Co. v. City of Minneapolis.—The expense of constructing and maintaining the necessary bridge over the gap in a railway right of way made by the municipal construction across it of a canal or water way with footpaths on each side connecting two lakes used for public recreation may be cast upon the railway company without denying it the due process of law guaranteed by the Federal Constitution.—34 Supreme Court Reporter 400.

Public Improvements—Special Assessments—Exemptions.

City of Moline (Ill.) v. Tri-City Ry. Co.—The franchise ordinance of a street railway company declared that, when the city council should order the paving of any of the streets upon which its railway was located, the company should properly pave between its tracks and for four feet from the center of each track, in the same manner and with such paving material as the city council should direct. This ordinance further declared that the street railway company should provide proper surface or underground drainage. Held that, by imposing this burden on the street railway company, it was exempted from special assessments for the improvement of the street, and this exemption included assessments for the construction of a storm drain which was part of the system of pavement.—Supreme Court of Illinois, 104 N. E. R. 271.

Public Improvements—Scope of Improvements.

City of Anna (Ill.) v. Northern et al.—Where a street railway is required by its charter to pave, maintain, and repair certain portions of a street, a city ordinance providing for the pavement of the street should exclude the

portion which under the contract must be paved by the railway company; but, if there is no contract, the ordinance may provide for the improvement of the street occupied by the street railway, and impose a special assessment, charging against the street railway company its proportion of the cost.—Supreme Court of Illinois, 104 N. E. R. 171.

Injuries in Streets—Proximate Cause.

Zorn v. City of New York et al.—While plaintiff was running his automobile truck along a highway, the gutter of which was being paved by defendant under contract with the city, the truck struck an uneven stone five or six inches in diameter, which was between two piles of stone placed along the side of the road by defendant, which caused plaintiff to lose control of the machine and run into a bank of dirt, and before he could regain control the machine ran into one of the stone piles. There were nine piles of stone along the sides of the road, about 75 feet apart, with a clear space of roadway of about 21 feet, and the street at that point was sufficiently lighted, and plaintiff knew of the presence of the stone piles. Held, that any negligence by defendant in maintaining the stone piles, or in not sufficiently lighting them, was not a proximate cause of the injury.—Supreme Court, Appellate Division, 147 N. Y. S. 70.

Employees—Removal or Discharge—Grounds.

People ex rel. Crowell v. Connolly, President Borough of Queens, N. Y. City.—A charge against an assistant engineer, in charge of a Borough Topographical Bureau, for approving a bill against the city for preparing certain benefit maps not in compliance with the original order, should not have been sustained where the original order was not produced, it appeared that the surveyor who made the maps was employed by the Borough President, the engineer having no part in ordering them, that his assistant approved the bill only as to the dimensions of the property, and that the bill was eventually paid after opinions were obtained from three assistants to the corporation counsel as well as from examiners, a chief of division, and an engineer in the finance department, that the charge was proper.—Supreme Court, Appellate Division, 147 N. Y. S. 186.

Detachment of Territory—Construction of Statutes.

Cole v. City of Watertown, S. D.—The power to add territory to or take it from a municipal corporation is a political power vested in the Legislature and in those to whom the Legislature delegates it, and courts exercising such relegated power are limited to the powers given by the express provisions of the statute.—Supreme Court of South Dakota, 147 N. W. R. 91.

Impairing Obligation of Contracts—Statutes—Ordinances—Validity.

Town of St. Helena (Cal.) v. San Francisco, N. & C. Ry.—A franchise granted by a municipality to a railroad company to maintain tracks in the streets, which provides that the company shall grade the streets and maintain the same in proper repair in the same manner as the remainder of the streets, and which declares that the franchise is granted subject to laws or municipal regulations in force, or that may be subsequently enacted relating to the control of public streets, is not such a contract between the municipality and the company as invalidates a subsequent statute authorizing ordinances requiring special paving by the company and an ordinance enacted pursuant to it.—District Court of Appeals, Calif., 140 P. R. 600.

Sidewalks—Reconstruction—Liability for Work.

Van Valkenburg v. City of Milwaukee (Wis.)—An ordinance for the reconstruction of a sidewalk called for a 15-foot sidewalk, and a contract for the removal of defective walks stipulated for the construction of 15-foot walks. An order from the board of public works provided for a certain number of square feet if amounting to a 6-foot, instead of a 15-foot, walk. Held, that the board could correct their mistake by providing an assessment for the cost of the 15-foot walk constructed.—Supreme Court of Wisconsin, 147 N. W. R. 67.

NEWS OF THE SOCIETIES

Calendar of Meetings.

June 23-24.
NEW YORK STATE FIRE CHIEFS' ASSOCIATION.—Annual Convention, Schenectady, N. Y. Chief Yates, Secretary.

June 23-25.
SOUTH CAROLINA STATE FIREMEN'S ASSOCIATION.—Tenth Annual Meeting and Tournament, Florence, Ala. R. S. Hovel, Secretary, Sumpter, S. C.

June 23-25.
STATE FIREMEN'S ASSOCIATION OF MICHIGAN.—Annual Convention, Saginaw, Mich.

June 23-26.
SOCIETY FOR PROMOTION OF ENGINEERING EDUCATION.—Annual Convention. Prof. H. H. Norris, Secretary, Ithaca, N. Y.

June 23-26.
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—Thirty-first Annual Convention. Detroit, Mich. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

June 23-26.
SOCIETY OF AUTOMOBILE ENGINEERS.—Annual Convention. Cape May, N. J. Chairman of Arrangement Committee, Arthur B. Cummer, 1790 Broadway, New York City.

June 24-25.
THE LEAGUE OF MICHIGAN MUNICIPALITIES.—Sixteenth Annual Convention. Bay City, Mich.

June 30-July 4.
AMERICAN SOCIETY FOR TESTING MATERIALS.—Seventeenth Annual Meeting, Hotel Traymore, Atlantic City, N. J. Edgar Marburg, Secretary, University of Pennsylvania, Philadelphia, Pa.

July 3-4.
AMERICAN SOCIETY OF ENGINEERS, ARCHITECTS AND CONSTRUCTORS.—Mid-summer Convention. Brighton Beach, N. Y. T. Hugh Boorman, Secretary, 35 W. 39th St., N. Y. City.

July 4.
SOCIETY OF ENGINEERING CONTRACTORS.—Annual Convention, Brighton Beach. J. Wemlinger, Secretary, 11 Broadway, N. Y. City.

July 9-11.
AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS.—Semi-annual Meeting. Cleveland, Ohio. Secretary, J. J. Blackmore, 29 West 39th St., New York City.

July 17 and 18.
TRI-STATE PACIFIC COAST GOOD ROADS ASSOCIATION.—Annual Convention, Medford, Ore. George E. Boos, Secretary, Medford.

July 16-19.
OHIO ELECTRIC LIGHT ASSOCIATION.—Annual Convention. Cedar Point Ohio. Secretary, D. L. Gasgill, Greenville, Ohio.

Aug. 5-7.
COUNTY COMMISSIONERS OF PENNSYLVANIA.—Annual Convention, Erie, Pa. T. W. Waterhouse, Chairman Local Committee.

Aug. 18, 19, 20.
FIREMEN'S ASSOCIATION OF THE STATE OF NEW YORK.—Geneva, N. Y.

Sept. 11-12.
STATE FIRE MARSHALLS' ASSOCIATION OF NORTH AMERICA.—Annual Convention, Asheville, N. C.

New York State Fire Chiefs' Association.

The 10th annual convention of the New York State Fire Chiefs' Association will be held in Schenectady June 23 and 24. The guests this year will include Chief John Kenlon, of the New York city fire department, and Signor Marconi, inventor of the wireless telegraph. Signor Marconi is scheduled to make an address on "Wireless Telegraphy" which will be illustrated with experiments. The program outlined will keep the fire chiefs busy for the two days of the convention.

Chief Henry R. Yates, of the Schenectady department, who is secretary of the association, has announced the following arrangements: The visiting delegates and members will get their convention badges and be given an opportunity to pay dues at the office of

Chief Yates in the central station Tuesday morning from 10:30 to 12:30 o'clock. The first session, at 12:30 o'clock, will be in Supreme Court chambers in the county building adjoining the central fire station. Prayer will be offered by the Rev. U. H. Graves, a chaplain of the department, and the freedom of the city will be extended to the visitors by Mayor J. Teller Schoolcraft. A short memorial service in honor of the chiefs who died in the last year will be conducted by Monsignor John L. Reilly, also a chaplain of the department. Members of the association who died in the last year are: Chief Michael Higgins, of Albany; Chief Fred Morrison, of Watertown, and Chief Leonard Briggs, of Rome.

George W. Booth, chief engineer of the National Board of Fire Underwriters, will discuss the advantages of a standard test for fire engines and comment upon the tests made at the convention last year in New York. The paper will be discussed by Chief Kenlon, of New York; Chief B. J. McConnell, of Buffalo; Chief Charles Little, of Rochester, and Chief John Mulcahy, of Yonkers.

Chief T. C. Collins, of Cohoes, will read a paper on "Pensions for Permanent Firemen," and the topic will be discussed by Chief R. A. Maxon, of Gloversville; Chief E. S. Shadwick, of Saratoga; Chief E. J. Cooney, of Little Falls, and Chief John J. Crotty, of Oneonta.

Chief Thomas O'Connor, of the General Electric Company's department in Schenectady, will present the subject, "Fire Prevention and Protection in Factories and Other Buildings." The discussion will be led by James M. Lynch, State Labor Commissioner, and John Quigley, former chief of the Syracuse Fire Department. State Fire Marshal Thomas Ahearn will deal with fire prevention in buildings other than factories. Chief C. N. Hogg, of Binghamton; Chief John Epsey, of Elmira, and Chief J. D. Sullivan, of Utica, will discuss the subject.

The afternoon session will be continued until 7:30 o'clock. A dinner will be given in the Edison hotel at 9:30 o'clock, at which W. W. Wemple, Commissioner of Public Safety, will preside. The speakers will include Mayor Schoolcraft, President Charles A. Richmond, of Union College; James H. Callanan, Judge A. A. Yates, Geo. E. Timmons, general manager of the General Electric Company's plant in Schenectady, and representatives of the chiefs' association.

A tour about the city in automobiles will occupy the morning of Wednesday, June 24. The motor pumping engines of the Schenectady department will be tested at noon in Dock street. The chiefs will then be entertained by the General Electric Company. At the close of the last session, Wednesday, the apparatus of the Schenectady de-

partment will pass in review before the visitors, who will be stationed on the steps of the county building.

Arizona Good Roads Association.

For the purpose of planning a campaign for the adoption of the proposed constitutional amendment providing a \$5,000,000 road bond issue, the Good Roads association of Arizona will hold a special meeting at Prescott, Ariz., July 3. Delegates are expected from every county in Arizona and also from Arizona and New Mexico. The National Highways association, with which the Arizona organization is affiliated, has promised to send several speakers of national reputation. A sterling silver cup will be awarded to the county which made the greatest progress in road building during 1913, taking into consideration the funds available for that purpose.

League of Michigan Municipalities.

At a meeting held on June 3d in Bay City, committees were appointed and plans completed for the entertainment of delegates to the convention of the League of Michigan Municipalities to be held in Bay City June 24 and 25.

The organization to handle the convention plans was first completed by the election of the following officers: Chairman, Lovell U. Grant; vice-chairman, Samuel Ball; secretary, J. C. McCabe; treasurer, L. W. Hine.

The entertainment committee consists of E. E. Prohazka, W. J. Bill, M. L. Saunders, W. J. Lambert and F. J. Wilkin.

The program will consist of business sessions in the morning, afternoon and evening, with automobile rides following the afternoon sessions. These auto rides will take the visitors to points of interest in the city.

There will be two sessions held the morning and afternoon of June 25. Early in the afternoon the entire party of visitors will be taken to Wenona Beach, where, following the business meeting, a banquet will be served in Wright's cafe.

Following the banquet the visitors will attend a special performance in the casino.

The committee will make a special effort to get out the officials from the cities and towns in Northeastern Michigan, although cities in all parts of the state will be represented. Special invitations will be sent to Alpena, Saginaw, Flint, Midland and other neighboring cities asking that they send a large delegation.

It is planned to make the convention the most eventful ever held by the association, and the committee intends to use every effort to properly entertain the visitors.

American Society of Civil Engineers.

Considering the season of the year, the forty-sixth annual convention of the society on June 2 to 5, brought a large number of members and guests to Baltimore, Md.

Of the three formal sessions one

was given over to the address of President McDonald, of Nashville, Tenn.; another was devoted to the consideration of the proposed Code of Ethics and some business, and the last was taken up with brief talks descriptive of the Baltimore public works which were inspected by members of the convention.

Much discussion was held on the Code of Ethics as drafted by the board of directors, but it was finally approved by the meeting and ordered sent to letter ballot. The Code named six things considered unprofessional for any member of the society to do.

The social side of the convention was very successful. It consisted of the following: A golf tournament at the Baltimore Country Club; an excursion to Annapolis (lunch and supper being served on the boat) and the entire afternoon being spent at the Naval Academy and its vicinity; trips to the water supply, sewerage, paving and harbor work of Baltimore; a visit to the plant of the Maryland Steel Co.; a ball and reception by the local Engineers' Club; an informal reception on Monday night and a farewell smoker on Friday evening.

During the sewerage trip a lunch was served in a 29-ft. drainage tunnel.

Short talks by the engineers of various city improvements served as preparations for a better understanding of the inspection trips made on Thursday afternoon. Four trips were arranged. These were led by and the works visited were previously outlined as follows: (1) City Planning and Paving, Joseph W. Shirley, Chief Engineer Topographical Survey; R. Keith Compton, Chief Engineer Paving Commission; H. K. McCay, City Engineer; F. W. McKinney, Chief Engineer Street Opening; (2) Drainage and Sewerage, Calvin W. Hendrick, Chief Engineer Baltimore Sewerage Commission; (3) Harbor Work, O. F. Lackey, Harbor Engineer; (4) Water-Supply and Filtration, Ezra B. Whitman, Water Engineer and President Water Board.

American Order of Steam Engineers.

With three hundred members in attendance, the American Order of Steam Engineers opened their convention at Baltimore on June 1 with a business meeting of the Supreme Council. Reports from various committees were read and over 88 exhibitors displayed their products. On Tuesday further reports and papers were read and recreation was provided for. On Wednesday the nomination of officers occupied much time and it was decided to carry on an educational propaganda through the paper published by the order. The following officers were elected on Thursday:

Supreme chief engineer, William J. Pairent, Philadelphia; first assistant supreme engineer, W. R. Smith, Allentown, Pa.; supreme recording engineer, William A. Harding, Atlantic City; supreme corresponding engineer, Edward A. Reboul, Philadelphia; su-

preme treasurer, Michael Helmstreit, Philadelphia; supreme master mechanic, J. H. Mowdy, Lebanon, Pa.; junior master mechanic, H. R. Dixon, Camden, N. J.; inside sentinel, Henry R. Messer, Columbia; outside sentinel, William Tyson, Reading, Pa., and trustee, George W. Goodwin of Baltimore.

Morning and afternoon sessions of the order took place on Friday, June 5.

Delaware County Firemen's Association.

At Lansdowne (Pa.) more than 400 delegates, representing all fire companies in Delaware county, attended on June 5 the eighth annual convention.

President Charles Salin, of Ridley Park, presided.

President Salin, founder of the association, was re-elected president without any opposition. The other officers are: Vice-presidents, George B. Frankenhof, Clifton Heights, and Thomas Fitzsimmons, Glenolden; recording secretary, Charles S. Sauter, Swarthmore; treasurer, Fred W. Myers, Norwood; fire marshal, Charles E. Clark, Wayne.

The convention ended with a parade given Friday morning.

Engineers' Club of Dayton.

At the opening of the Engineers' Club, on May 14, the dedicatory program included an address by Mayor G. W. Shroyer, William Lodge, M. A. S. C. E., and F. H. Rike, president of the Greater Dayton Association.

An inspection of the house followed the program, and music and refreshments filled out an evening that was most enjoyable to the members.

One of the important features of the club will be the bringing to the city of well-known speakers, who will talk upon various engineering subjects, so that the younger engineers of the city can learn of the most improved methods and the great works that are being successfully undertaken by the world's greatest engineers.

A reception was given in the afternoon by the wives of the members.

New Jersey Police Chiefs.

The New Jersey police chiefs held their regular monthly meeting at the State Home for Boys at Jamesburg and twenty-five of the sixty chiefs were in attendance. Assistant Superintendent Smith made an address, explaining the methods followed in looking after the boys. The visitors were shown throughout the home, and also witnessed a drill by the boys.

The chiefs present were: Frank Monahan, of Jersey City; M. O'Connell, of New Brunswick; Frank Titus, of Englewood; Patrick S. Kiely, of Plainfield; Alexander S. Irving, of Irvington; George W. Brown, of Summit; John Fross, of Garfield; Michael J. McIntyre, of Kingsland; George McClelland, of East Rutherford; David H. Ramsey, of Rahway; William Tolen, of Kearney; Michael Rogers, of Harrison; Henry Galla-

gher, of Montclair; Patrick Murphy, of Woodbridge; Patrick J. Burke, of Perth Amboy; Peter E. Pulls, of Ridgewood; J. Frank Hallaway, of Morristown; John Bimson, of Paterson; Jacob Dunn, of Hackensack; John McAulay, of West Hoboken; George Bedford, of Highland Park; Charles Wallum of Town of Union; Michael Mulcahey, of Elizabeth.

Western Society of Engineers.

The society was addressed June 1 by F. W. Greve, Jr., on "Characteristic Curves of Centrifugal Pumps." Although this was the last regular meeting before the summer vacation there will be two or three section and special meetings in June. W. G. Potter described the sewage disposal plant at Aberdeen, S. D., June 15. Alexander Brown, of the Brown Hoisting Machinery Company, delivered an illustrated talk on "Locomotive Cranes" on June 8.

Cement Product Exhibition.

Announcement has been made by the Cement Products Exhibition Co., 208 South La Salle Street, Chicago, that the Eighth Annual Chicago Cement Show will be held in the Coliseum, February 10-17, 1915. February is looked upon as the most advantageous season for the show. It has been found that contractors, engineers and cement users are able to attend the exhibition in that month, and it is the time when the maximum amount of purchasing and specification of equipment and supplies is done.

Only one Cement Show will be held in 1915. The time has been shortened and arrangements have been made to give the exhibitors more time both in installing and removing exhibits. The management of the Chicago Show is confronted by the problem of finding enough space to accommodate all the exhibitors who seek representation. At the show in February of this year, every square foot of available space, both in the main building and the Annex, was leased long before the opening. About seventy-five manufacturers who desired to exhibit filed their applications too late to obtain reservation. The use of the Coliseum balcony and the Seventh Regiment Armory was seriously considered for a time. The idea was abandoned, however, owing to the inaccessibility and excessive cost of putting these places in condition for displays. No satisfactory solution of the problem of too little space is in prospect. The policy of allotting floor space to the earliest applicants will be followed in connection with the next Cement Show as has been the case in the past.

A new floor plan has been developed which, it is believed, will meet with universal approval. A greater number of spaces will be provided and it will be possible to give the main avenues an attractive appearance. A uniform installation plan, without high partitions, will be adopted. The manage-

(Continued on page 919.)

NEW APPLIANCES

HOLLOW BLOCK CONSTRUCTION FOR SEWERS.

"Natco" Hollow Tile Principle Applied to Sewer Construction—An Inner-and-Outer Tile Design.

The progress of the hollow-tile-segment type of sewer construction was marked by the entry into this field of the National Fireproofing Co. of Pittsburgh, Pa., makers of the widely-used "Natco" Hollow Tile products. This was proved by a demonstration test of a 48-inch sewer built at Columbus, O., which was witnessed by engineers and contractors from Pittsburgh, Cincinnati, Cleveland, Detroit and New York. The principle of this type of construction is the use of a hollow glazed brick of such pattern that by lapping and locking joints a continuous cylinder may be built up, the principle being the same as that of silo construction. The "Natco" lock-joint sewer tile is the invention of H. B. Naylor of the National Fireproofing Company. The test was made by piling ten tons of cement in bags on the 48-inch sewer section, the weight on the sewer being 1,000 pounds to the square foot, and the pressure per lineal foot being 3,090 pounds. The pipe showed no signs of strain or fracture. A section may be suspended on a one-inch bolt-head twenty-four hours after building.

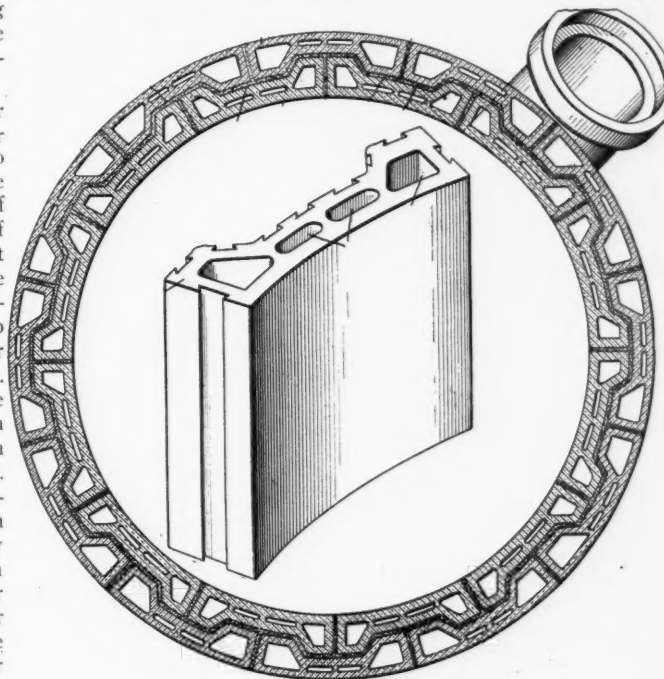
The "Natco" lock-joint sewer tile is salt-glazed so that it will turn any acid or sediment that it may have to carry. It is made in sections of two pieces which can be made in any size. These sections are designated as the

outer and inner piece so that when they are laid they lap joints from 6 to 9 inches, giving a perfect cement coating and water-tight joint. The tiles are made double and are broken by a chisel blow. The single tile, the method of connecting and the method of determining the curvature are shown in the illustration.

In excavating for the "Natco" sewer it is necessary to have a templet made of the diameter of the outside circle of the sewer so that the bottom of the ditch can be excavated to a radius to receive the outer section of the sewer. The outer tiles are placed just as in brick construction and cement joined. When the outer segments have been laid so that they cover up each side of the sewer about one-quarter of a block past the first half, the inner are placed to the same height. A round center an inch thick is then inserted in the lower half to arch the top. The center is removed into the next section of blocks. If the ground is of a marshy or soggy nature and

will not hold, the "Natco" tile can be laid upon a templet outside in six to eight feet sections and after twenty-four hours can be lowered into the ditch in half sections.

The advantages of the hollow tile type of construction is that the tiles,



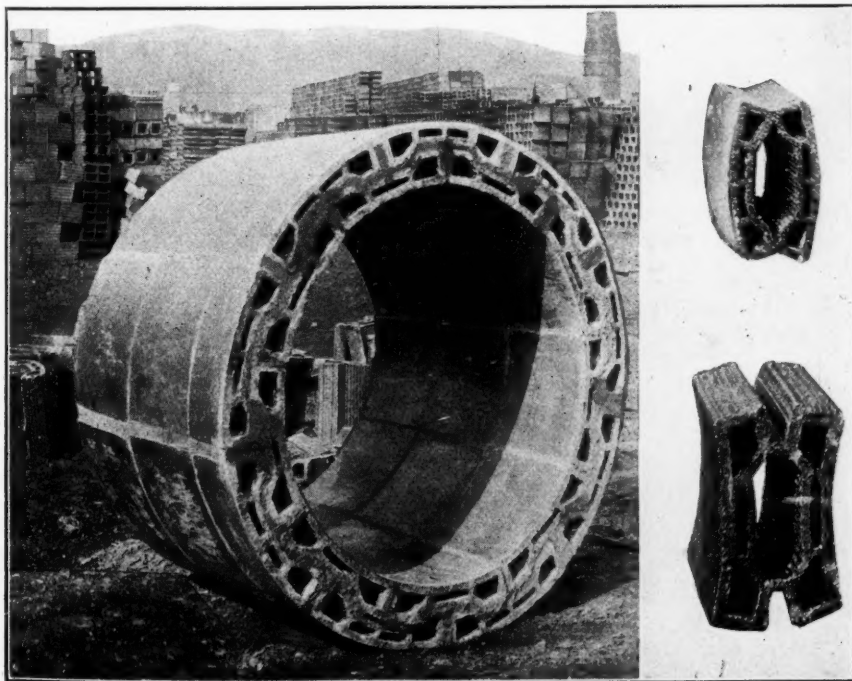
CROSS-SECTION OF "NATCO" TILE SEWER.

being larger units, are much easier to lay, giving a lower labor cost. They give a smooth inner surface. They can build sewers larger than 36 inches—the vitrified pipe limit. They are salt-glazed and therefore more sanitary. "Natco" lock-joint sewer tiles may be used also for underground conduits for gas-pipes, electric cables and other underground carriers.

NEW POWER DIAPHRAGM PUMP.

A New Goulds Pump With Gasoline Drive—A Contractor's Portable Outfit.

For pumping out excavations, cellars, trenches, quarries or for similar services where a portable power pump is desired, the Goulds Power Diaphragm Pump, shown in the illustration, should make a very useful contractor's outfit. It is mounted with a small gasoline engine, either on a frame or on a truck. The pump is geared five to one, and can be connected to any engine directly by gearing proportioned to the speed of the engine or by belt. When furnished for belt drive, this pump is fitted with a single tight pulley 12 inches in diameter by 3-inch face. When furnished for direct connection to engines it is fitted with a second reduction of gear-



"NATCO" LOCK-JOINT SEWER TILE, SHOWING INNER AND OUTER TILES.

ing, consisting of engine gear and engine pinion. This is furnished with several different ratios of engine gear and pinion, which gives a large overall reduction and allows the pump to be direct connected to practically any engine. The base of the pump is square and is provided with extra large holes for bolting securely to the mounting. The pump is fitted for side suction and has a rubber suction valve resting on an inclined seat, thus offering the least resistance to the passage of liquids. A rubber diaphragm of the best quality rubber takes the place of a plunger. The discharge valve, which is of metal, rests on the diaphragm and is easily removable. The waterways are large and are designed to handle a large amount of liquid easily. This diaphragm pump may be used for handling muddy and gritty water or sewage, as it is claimed that the foreign substances in the water cannot injure the pump. The pump is made by the Goulds Mfg. Co., Seneca Falls, N. Y.

BARRETT PIPE-FORCING JACK.

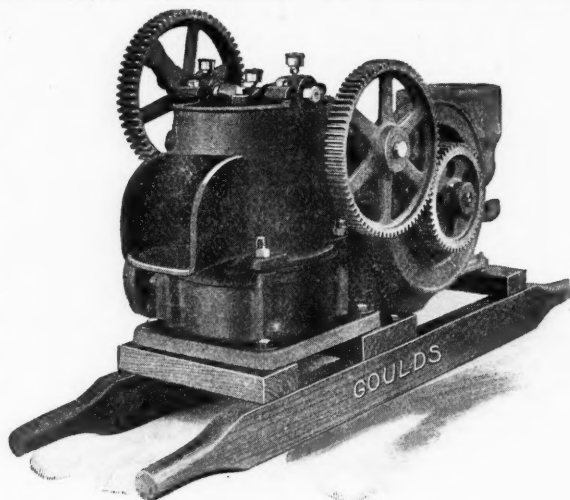
Forces Pipe Under Tracks and Sand Paving Without Need of Excavation.

The Barrett Pipe-Forcing Jack, made by the Duff Manufacturing Co., Pittsburgh, Pa., is claimed to save two-thirds of trenching and refilling cost in laying pipe and that pipe may be forced for distances varying from 60 to 300 feet. It consists of a malleable iron cage traveling on a steel-toothed rack and operated by a handle. At the

front of the cage is a groove and clamp for holding pipe $\frac{3}{4}$ to 4 inches in diameter. The rack is fitted with foundation plates and bolts for fastening to a plank and it carries two guides for keeping the pipe in line. The interior working parts are of steel and the jack is claimed to stand any resistance up to 30,000 pounds. The length is $8\frac{1}{2}$ feet and the travel of the cage is $7\frac{1}{2}$ feet. The weight is 185 lbs.

In using the jack no special tool is required except a "pilot," a short piece of pipe with a coupling turned to a cutting edge in front. A trench about fifteen feet long and two feet wide is dug to hold the jack. The rack is fastened to a heavy plank. The rack is placed at the back end of the trench, the cage is put on and then the guides,

and finally the first length of pipe. The pilot is plugged near the reducing coupling, so that dirt enters in front, but does not get into the service pipe. To facilitate the cutting the service



GOULDS POWER DIAPHRAGM PUMP.

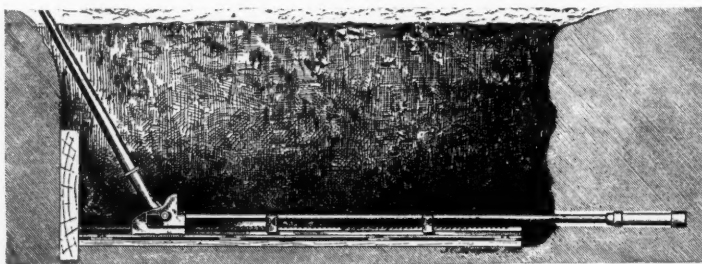


DIAGRAM OF JACK FOR FORCING PIPE.



BARRETT PIPE-FORCING JACK AT WORK.

pipe is kept turning with a pipe wrench.

The Barrett Jack has been used very successfully, particularly by gas and electric companies and traction corporations—some of these being in Utica, N. Y., Crookston, Minn., Moline, Ill., Fort Smith, Ark., Pueblo, Colo., Muncie, Ind., Vancouver, B. C., Fort Worth, Tex., and Saginaw, Mich.

In the case of the Peoples' Power Co. of Moline, Ill., it was found that while formerly four men laid five or six services a week three men can now lay eight or nine. There are twelve jacks working and at \$2 a day labor rate about \$400 per week is being saved.

BUBBLE DRINKING FOUNTAINS.

A "germ-proof fountain" is what James B. Clow & Sons of Chicago call their bubble drinking fountain.

The important feature of this fountain is the "bubbling cup," which is said to differentiate the Clow product from others in that it is more sanitary. There is no rim around the cup which must be pushed down to start the cup flowing, and the bubble comes up so high that it is impossible for the drinker to get his lips down to the cup. All the cups are said to be so arranged as to completely clean themselves and the rims are well rounded, thus obviating the possibility of the user cutting the lips.

The fountain shown in the illustrations is known as the "Hygiene" drinking fountain. The city of Chicago has installed in its streets 500 such fountains. It consists of an Adamantose bowl and pedestal in one piece, brass supply pipe with loose-key regulating valve, floor flange, bolts and gaskets. As an added convenience a self-closing regulating stop valve with lever handles may be installed with this fountain.

The bubbling cup fountains are made in several styles adapted for many needs and purposes. Among present users of the Clow fountains are: Toledo, Cleveland, Detroit, Kalamazoo, several hospitals, schools and business houses.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago.—Public lettings were of little consequence. Quotations: 4 inch, \$26; 6 to 12 inch, \$24; 16 inch and upward, \$23.50. Birmingham—Market is holding its own along lines existing for some time, with a 50 per cent capacity output and no accumulations. Quotations: 4 inch, \$20.50; 6 inch and upward, \$18.50. New York—Outlook is more encouraging. Quotations: Carload lots of 6 inch, \$20.50 to \$21 per ton.

Lead Pipe.—St. Louis, \$3.80; New York, \$3.90.

Pneumatic Tire Casings.—The Good-year Tire & Rubber Co. have turned out 52,873 pneumatic tire casings for automobiles and motorcycles in one week recently. This broke the world's record for production which they had previously established. The company also turned out in one day 11,032 casings, which, it claims, is more than twice as many as any other factory has ever produced in the same period.

Liquid Chlorine Control Apparatus.—Wallace & Tierman Co., Inc., of New York, have recently supplied their apparatus to the city of Scranton, Pa., and Alexandria, Va. Both cities will purify their drinking water with the Wallace & Tierman apparatus.

Steam Turbines.—The Terry Steam Turbine Co., of Hartford, Conn., states that, despite the dull season, they have finished one of the largest months of their history in point of orders received. To take care of the increased business, additional machine tools have been installed, increasing the capacity of the plant about 25 per cent.

New Catalogue.—An interesting booklet has been issued, describing installations of elevating and conveying machinery for handling newspapers, books, magazines, etc., in publishing and printing houses. These installations are made by Link-Belt Co. of Chicago, Ill. The catalogue should be of interest to engineers, architects and newspaper men.

Motor Trucks.—The Tiffin Wagon Co., of Tiffin, O., has placed on the

market motor trucks which are adaptable for commercial and municipal needs. The Tiffin motor sprinkler has a capacity of 600 gallons, and a special chassis, known as Model G.

Goodrich Touring Bureau.—This bureau is maintained by the B. F. Goodrich Co., Akron, O., for the convenience of motorists. All over the country the touring bureau has erected sign posts to direct motorists. Route books have been gotten up to indicate every good road in the country and other valuable data. Besides the United States, information is also given in these booklets, which can be obtained at any Goodrich branch, concerning Canada and Europe.

New Appointments.—The Knox Motor Co., of Springfield, Mass., has announced the appointment of George M. Davis as assistant sales manager, and Charles F. Barrett as advertising manager.

Electrical Companies Incorporated.

The National Electric Distributor Corporation has filed articles of incorporation under the laws of the state of Delaware. The company, capitalized at \$500,000, proposes to manufacture and deal in machinery to generate electricity. The incorporators are: H. E. Latter, W. J. Maloney and O. Reichard, of Wilmington, Del.

The Willis Mitchell Company, of New York, N. Y., has been incorporated by S. B. Britton, J. J. Jansen, Jr., and W. P. Powell, of New York, N. Y. The company is capitalized at \$100,000 and purposes to install light, heat and power systems and deal in machinery.

The Columbian Electric Vehicle Company has filed articles of incorporation with a capital stock of \$300,000 under the laws of the state of Delaware. The concern will go into the manufacture of vehicles of all kinds. The incorporators are W. M. Pyle, G. G. Stiegler and L. W. E. McCarthy, of Wilmington, Del.

The MacLewer Electric Company, of Trenton, N. J., has been incorporated by W. S. MacLewer, H. M. Hartman and F. R. Brace, of Trenton, N. J. The company is capitalized at \$100,000 and proposes to manufacture electrical appliances, etc.

NEWS OF THE SOCIETIES.

(Continued from page 916)

ment will again prepare the exhibit spaces so that no attention on the part of the exhibitors will be necessary other than to place their exhibits in position.

It is expected that the floor plans, application blanks and complete information will be sent out from the offices of the Cement Products Exhibition Co. to the list of respective exhibitors not later than August 1. An early drawing for space will be held. After assigning the space the remainder of the year will be devoted to the advertising of the Show and the promotion of a big attendance of engi-

neers, architects, dealers, contractors, builders and cement users.

PERSONALS

The following mayors have been recently elected:

Columbia, S. C.—Dr. Lewis A. Griffith.

Martinsburg, W. Va.—Thomas Turner.

Hyattsville, Md.—Capt. O. A. Greager.

Mt. Reiver, Md.—F. E. Webber.

Capitol Heights, Mo.—L. J. Laugh-ton.

Takoma Park, Md.—S. W. Williams.

Rockville, Md.—Lee Offatt.

Granite Falls, N. C.—D. M. Cline.

Highland, N. C.—J. E. Shook.

Fort Wayne, Ind.—Mayor William J. Hosey has been chosen president of the Uper Wabash and Maumee River Flood Prevention Association.

Grafton, T. E., Rome, Ga., has assumed the office of superintendent of public works.

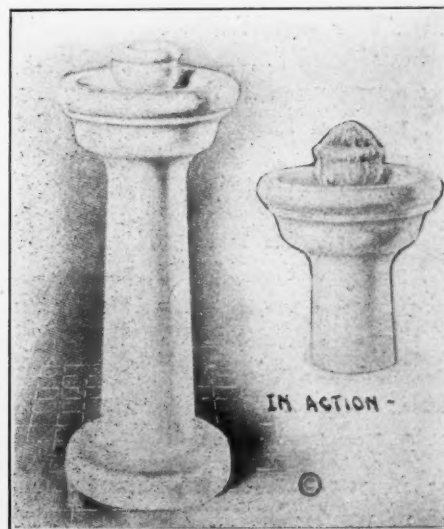
Fawcett, A. V., Tacoma, Wash., has been elected mayor for the third time.

Crowell, Robert R., Long Island City, N. Y., who was suspended from his position by Board President Lawrence Connolly, has been ordered reinstated by the courts, Justice Connolly saying that the charges against him were slight and ill-founded.

John J. Jolce has been appointed engineer in charge of inter-county highway work between Oak Harbor and Genoa, Ohio, by the Ohio Highway Commission.

Mr. Morton F. Sanborn, Assoc. M. Am. Soc. C. E., Civil and Sanitary Engineer, of Pleasantville, N. Y., has been appointed Assistant Sanitary Engineer of the New York State Department of Health.

Henry Byrne was elected to fill out the expired term of James J. Ferris as a commissioner of Jersey City, N. J.



CLOW SANITARY BUBBLE FOUNTAIN.

ADVANCE CONTRACT NEWS

ADVANCED INFORMATION BIDS ASKED FOR

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREETS AND ROADS				
Ind.	Fort Wayne	10 a.m., June	20..Grading, draining and paving with stone.....	D. H. Brown, Co. Aud.
Ark.	Lonohe	.....June	20..Constructing eleven miles of macadam highways.....	H. R. Carter, State Hwy. Engr., Little Rock
Pa.	Beaver	.....8 p.m., June	20..Paving 10,000 ft. concrete sidewalk 5 feet wide.....	L. F. Northrop, Sec. Twn. Council Boro. of Baden
R. I.	Woonsocket	.....June	20..Paving with granite.....	F. M. Miles, City Engr.
Ark.	Little Rock	.....June	20..Eleven miles of highway.....	State Highway Dept.
Fla.	Orange Park	.....4 p.m., June	20..Paving about 16,000 sq. yds.....	L. E. Spencer, Clk. Comm.
O.	Toledo	.....10 a.m., June	21..Repairing road with Bermudez asphalt.....	P. J. Sanzenbacher, Aud.
Tex.	San Antonio	.....4 p.m., June	22..Paving certain streets, about 890,000 sq. yds. in area. (See proposal ad).	Fred Fries, City Clk.
N. J.	Elizabeth	.....June	22..Constructing brick pavement, flagging and curbing, etc.....	W. P. Neafsey, St. Comr.
Kan.	Coffeyville	.....Noon, June	22..Constructing bridges and culverts.....	City Clerk.
Minn.	Mankato	.....3 p.m., June	22..10,500 feet of road.....	C. L. Kennedy, Co. Aud.
Tex.	San Antonio	.....June	22..690,000 sq. yds. paving.....	City Clerk.
Ind.	Fort Wayne	.....10 a.m., June	22..Grading, draining and paving with concrete.....	D. H. Brown, Co. Aud.
S. D.	Colome	.....8 p.m., June	22..Constructing 1,000 ft. of 12-ft. cement sidewalk.....	E. Bingham, Town Clerk.
O.	Marengo	.....June	22..Grading, curbing, macadamizing, etc.....	T. E. Buck, Eng., Mt. Gilead
Ind.	Kokomo	.....10 a.m., June	22..Sidewalk.....	Board Public Works.
Ia.	Burlington	.....9 a.m., June	22..Grading and paving with vit. brick block on 4-in. concrete base.....	H. G. Vollmer, City Engr.
Wash.	Seattle	.....2 p.m., June	22..Constructing permanent highway.....	B. Phelps, Clerk.
Neb.	Falls City	.....7.30 p.m., June	22..Paving intersections; cost, \$4,000.....	G. Reichers, City Clk.
Ia.	Waterloo	.....June	22..Paving three streets.....	R. L. Dedon, City Clk.
Ky.	Versailles	.....7.30 p.m., June	22..Furnishing and laying on concrete base about 6,000 sq. yds. of vit. brick pavement; alternative bid on asphalt.....	H. C. Taylor, Mayor.
N. J.	Garwood	.....8 p.m., June	23..Constructing 7,624 ft. of 4 ft. by 4 in. concrete sidewalk and 40 ft. of concrete curb.....	C. B. Keim, Boro. Clk.
W. Va.	Huntermville	.....Noon, June	23..258 rods of road.....	County Commissioners
N. Y.	Pelham Manor	.....8 p.m., June	23..Permanent pavement on one street.....	H. N. Babcock, Vil. Clerk.
Cal.	Sacramento	.....11.30 a.m., June	23..Erecting and completing reinforced concrete sewage pumping station, with necessary pumping machinery.....	M. J. Desmond, City Clerk.
Ind.	Salem	.....8 p.m., June	23..Paving.....	W. W. Shanks, Clk. Twn. Bd.
O.	Tiffin	.....noon, June	23..vitrified brick or asphalt block.....	Wm. Heller, Dir. P. S.
O.	Antwerp	.....June	23..Paving one street.....	Village Clerk.
N. J.	Passaic	.....2 p.m., June	24..Improving several streets.....	J. Wollenberg, Dir.
N. J.	Paterson	.....June	24..Bituminous concrete.....	Board of Freeholders.
Ill.	Chicago	.....11 a.m., June	24..Paving with brick and constructing conc. curb & gutter.....	Local Board of Imp.
N. Y.	Tuckahoe	.....June	24..Grading and paving several streets.....	Board Village Trus.
Ind.	Marion	.....2 p.m., June	24..County road.....	Harold Guthrie, Co. Aud.
N. J.	Paterson	.....June	24..Improving turnpike with bituminous concrete.....	Board of Chosen Freeholders.
Pa.	Scranton	.....11 a.m., June	24..Constructing macadam road.....	C. P. Savage, Co. Controller
S. D.	Milbank	.....June	24..Cement sidewalk, crosswalks, curbs and waterways.....	M. G. Niles, City Auditor.
Minn.	Glenwood	.....2 p.m., June	25..Culverts, clearing, grading, gravelling, etc.; cost, \$9,165.....	O. Irgens, Co. Aud.
Mont.	Harlowtown	.....8 p.m., June	25..About 49,000 sq. ft. concrete walk, 6,100 ft. of curb, 4,170 sq. ft. crosswalk, two retaining walls, etc.....	S. K. Campbell, Town Clk.
Ohio	Mt. Gilead	.....11 a.m., June	25..Grading two county roads.....	Co. Comrs.
N. J.	Elizabeth	.....2.30 p.m., June	25..Excavating, constructing gutters and drains & paving with bituminous concrete and stone block.....	J. L. Bauer, County Engr.
Ind.	Ft. Wayne	.....10 a.m., June	25..Stone road.....	C. H. Brown, Co. Aud.
O.	Eaton	.....noon, June	25..Brick, asphaltic concrete, reinforced concrete, bituminous concrete or other surfacing.....	L. Dalrymple, Vil. Clk.
N. Y.	Albany	.....June	25..Constructing and repairing several state highways.....	J. N. Carlisle, Comr.
Ark.	Fort Smith	.....Noon, June	25..Paving 17,800 sq. yds. wood block, brick asphaltic concrete or plain concrete.....	H. C. Read, Ch. Bd. Imp.
Wis.	Janesville	.....2 p.m., June	25..5,826 ft. of combined cement curb and gutter; 360 ft. of cement covered gutter.....	Board Public Works.
Minn.	Crookston	.....2 p.m., June	25..Gravelling state road, 1,834 cu. yds.....	H. J. Welte, Co. Auditor.
Ohio	Cincinnati	.....Noon, June	26..Cleaning and oiling pike.....	County Commissioners
O.	Delaware	.....10 a.m., June	27..Macadamizing 4½ miles of road.....	F. C. Higley, Co. Surv.
Ind.	Terre Haute	.....June	27..Concrete.....	Co. Comrs.
O.	Cleveland	.....June	27..Improving several roads.....	County Comms.
Wis.	Delavan	.....10 a.m., June	27..Cement curbs and gutters.....	W. H. Horton, Chm. St. Com.
Mont.	Billings	.....2 p.m., June	27..Grading and paving two roads.....	F. E. Williams, Clk. Co. Comrs.
O.	Cambridge	.....About July	28..Paving various streets.....	G. B. Clark, Dir. P. S.
Wash.	Olympia	.....June	29..Surfacing with crushed rock, about 4 miles.....	State Highway Bd.
Utah	Ogden	.....10 a.m., June	30..Constructing asphalt pavement on concrete base.....	F. O. Stanford, City Recorder
O.	Marion	.....noon, June	30..Constructing paving and sandstone sidewalks.....	H. C. Cass, Dir. P. S.
O.	Shelby	.....June	30..Grading, draining, curbing 3,100 sq. yds. either brick, water-bound macadam or bitumen macadam.....	C. A. Schikler, City Engr.
S. D.	Alexandria	.....July	1..Five miles of grading.....	County Auditor.
O.	Hicksville	.....July	2..Paving 20,000 sq. yards.....	O. P. Bevington, Clerk.
Ind.	Tipton	.....July	6..Three gravel roads.....	G. H. Transberger, Co. Aud.
Ind.	Newport	.....10 a.m., July	6..Gravel.....	Roy Slater, Co. Aud.
Cal.	East San Diego	.....July	6..Improving portions of street by curbing, sidewalk and paving.....	City Clerk
Miss.	Forest	.....11 a.m., July	6..Six miles.....	W. A. Turner, Sec. Hwy. Comm.
N. J.	New Brunswick	.....July	6..Paving one street.....	City Clerk.
N. Y.	Albany	.....1 p.m., July	6..Improving highways in a number of counties. (See proposal ad).	J. N. Carlisle, Comr.
N. D.	Mohall	.....2 p.m., July	6..Three grading jobs.....	D. Carlson, Auditor.
Mont.	Roundup	.....July	6..Constructing cement crosswalks.....	City Clerk.
N. D.	Williston	.....July	9..About 60,000 cu. yds. of earthwork in road improvements.....	J. C. Field, Co. Surv.
O.	Dayton	.....10 a.m., July	9..Paving floors of several bridges with creosoted Hex blocks.....	County Comrs.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Ind., Crown Point.....	July	9..	Gravelling several roads.....	County Board Comrs.
Fla., Tampa.....	10 a.m., July	10..	Improving one city road.....	W. P. Culbreath, Clerk.
O., Cincinnati.....	Noon, July	10..	Repairing pike 5,000 ft. and improving one road.....	County Comrs.
Ind., Brownstown.....	10 a.m., July	11..	Gravel road.....	E. W. Edwards, Co. Aud.
Minn., Shakopee.....	10 a.m., July	13..	Road culverts.....	A. J. Meyer, Co. Auditor
Minn., Buffalo.....	2 p.m., July	15..	Grading and gravelling two roads.....	J. A. Berg, Co. Aud.
Miss., Tupello.....	noon, July	16..	Furnishing and constructing culverts and surfacing either with gravel or concrete about 47 miles of h'way..	E. W. Robins, Hwy. Comr.
SEWERAGE				
Minn., Crosby.....	June	20..	Storm sewer.....	Village Clerk.
Conn., Greenwich.....	noon, June	20..	Erecting disposal plant.....	F. A. Cleveland, Bureau Mun. Research.
Wis., Ripon.....	4 p.m., June	22..	Sewers.....	J. W. Pierce, City Clk.
Conn., Middletown.....	June	22..	16,187 ft. 8-15-in. vit. pipe sewer, reinforced conc. settling tank, including superstructure, sludge bed, etc.....	J. M. Lucey, City Engr.
Okla., Collinsville.....	June	22..	Material and constructing sewage disposal plant with Imhoff tank and contact bed.....	City Business Mgr.
Cal., Los Angeles.....	June	22..	Constructing storm sewer, estimated cost, \$125,000.....	Board Public Works
Ind., Kokomo.....	10 a.m., June	22..	Vitrified tile sewer.....	Board Public Works
Ont., Toronto.....	June	23..	Constructing sewers in several streets.....	Chr. Board Control
O., Tiffin.....	noon, June	23..	Sewer.....	Wm. Keller, Dir. P. S.
N. J., Atlantic City.....	10 a.m., June	23..	120,000 ft. of ditching in salt marshes.....	Co. Mosquito Exterm. Comsn.
N. J., Belleville.....	9.30 p.m., June	23..	Constructing sanitary sewer.....	J. T. Sheppard, Town Engr.
N. J., Newark.....	June	23..	Two sections of sewer.....	Passaic Valley Sew. Comsn.
Ark., Clarendon.....	June	24..	Constructing a sewer system.....	City Secretary.
N. Y., Orange.....	2.30 p.m., June	24..	Constructing about 25 miles of vit. pipe sewer.....	Board of Selectmen.
N. Y., Brooklyn.....	11 a.m., June	24..	Furnishing material and constructing sewers in several streets.....	L. H. Pounds, Boro. Pres.
Ind., Brennan.....	June	24..	Sewer, consisting of 900 15-in., 2,050 ft. 12-in., 1,910 ft. 10-in. vit. sewer tile, inlets, house connections, etc.....	T. F. Noblock, Town Clerk
Conn., West Haven.....	2.30 p.m., June	24..	Constructing 35 miles of vit. pipe sewer, 8-24 ins. (See proposal ad.).....	Clyde Potts, 30 Church St., N. Y. City.
Pa., Lebanon.....	5 p.m., June	25..	Constructing sewer.....	T. R. Crowell, City Engr.
Neb., Norfolk.....	About June	25..	Storm sewer; cost, \$2,000.....	H. H. Tracy, City Engr.
N. J., Newark.....	2 p.m., June	25..	Constructing Part 9 of main intercepting sewer.....	Passaic Valley Sew. Comrs.
Pa., Lebanon.....	5 p.m., June	25..	About 55,000 ft. of vit. pipe sewer, 6 to 18-inch.....	T. R. Crowell, City Engr.
Minn., Revere.....	8 p.m., June	26..	2,160 ft. 10 to 20-in. combined sanitary & storm sewers.....	F. B. Grinder, Vil. Recorder.
N. Y., Albany.....	June	29..	Imhoff tank, outfall sewers and drying beds.....	Board Con. & Supply.
Tenn., Fayetteville.....	2 p.m., June	30..	Sanitary sewer system.....	Bd. of Aldermen.
La., New Orleans.....	noon, July	30..	Wire and cables for drainage system.....	F. S. Shields, Sec. Water Bd.
La., Montezuma.....	June	30..	Constructing sanitary sewer of vit. clay tile 6-12-inch diameter.....	Town Clerk
Ia., Creston.....	About June	30..	1,100 ft. 12-in., 2,890 ft. 10-in., 8,622 ft. 8-in. and 12,930 ft. 6-in. vit. pipe sewer.....	J. F. Golden, City Clerk
Wis., Merrill.....	4 p.m., June	30..	Constructing sewers in various streets.....	W. J. Keyes, City Clk.
Mont., Choteau.....	6 p.m., July	6..	Sanitary sewer and disposal plant (see proposal ad.).....	S. L. Powers, Town Clerk
N. J., Plainfield.....	July	6..	Constructing sanitary sewers.....	J. P. McMurray, City Clk.
Wis., New London.....	8 p.m., July	7..	Sewers in several streets.....	C. J. Thompson, City Clk.
O., Columbus.....	Noon, July	13..	Constructing sewage disposal plant and sanitary sewer.....	John Sott, Clk. Co. Comrs.
Ia., Guthrie Centre.....	July	14..	Sewer work to cost about \$3,700.....	S. B. Weeks, City Clk.
D. C., Washington.....	2 p.m., July	14..	Furnishing and delivering electrically-operated centri- fugal sewage pumps.....	District Commrs.
N. J., Newark.....	July	14..	Constructing Section 12 of sewer.....	Passaic Valley Sew. Comsn.
Fla., Daytona.....	July	15..	21 miles 8-24-inch vit. pipe sewer, 430 tons c. i. pipe, 16,000 ft. galv. iron pipe, etc.....	Bd. Pub. Works
WATER SUPPLY.				
Sask., Saskatoon.....	June	20..	Four million gallons centrifugal pump.....	City Commissioners.
Fla., Daytona Beach.....	June	20..	Constructing municipal water works system.....	S. Smith, Councilman.
Pa., Allentown.....	5 p.m., June	22..	Furnishing cast iron pipe, gate valves, pump houses, pumps, etc.....	Borough Engineers
N. D., Williston.....	8 p.m., June	22..	Constructing filtration plant, water tower, tank, pump and main trunk line.....	G. G. Harvey, City Aud.
Mont., Great Falls.....	8 p.m., June	22..	300 tons of cast-iron pipe and 20,000 lbs. of specials.....	W. H. Harrison, City Clk.
Wash., Puget Sound.....	10 a.m., June	23..	Supplying iron pipe and fittings.....	Bur. Sup. & Acct., Navy Dept., Wash., D. C.
Cal., Mare Island.....	10 a.m., June	23..	Furnishing iron pipe and fittings.....	Bur. Sup. & Accts., Navy Dept., Wash., D. C.
Alta., Calgary.....	June	24..	100 1-inch, 50 3/4-inch and 20 2-inch water meters.....	City Commrs.
Ark., Clarendon.....	June	24..	Constructing water works.....	J. W. Hooper, Sec. Bd. Imp.
Kan., Coldwater.....	June	25..	100 H.P. oil engine, 75 K.W. generator, 10,000 gal. fuel oil storage tank, switchboards and other instruments.....	City Clerk.
Ill., Chicago.....	11 a.m., June	25..	Water tunnel.....	L. E. McGann, Comr. P. W.
Neb., Mead.....	June	26..	Water works and electric light plant, cost \$13,000.....	Bruce & Standeven, Engrs., Omaha
Ill., Rockford.....	June	27..	Drilling one well.....	Supt. Water Supply
Minn., Canton.....	7.30 p.m., June	29..	Constructing water works system complete.....	W. A. Masters, Vil. Clk.
Tex., Fort Bliss.....	11 a.m., June	30..	Extending water works system.....	W. E. Hunt, Depot Q. M., El Paso
N. Y., Sidney.....	about July	1..	Constructing water works, cost \$125,000.....	Village Clerk.
Mo., Charleston.....	July	2..	Constructing water works, sewerage system, sewage treatment works, etc.....	Mayor
S. D., Tripp.....	July	15..	Sewers and sewage treatment plant.....	Dakota Engrg. Co., Mitchell
Neb., Dalton.....	Aug.	27..	Constructing water works, cost \$7,200.....	J. L. Willis, Village Clk.
LIGHTING AND POWER.				
N. J., Woodbridge.....	8 p.m., June	22..	Lighting streets with 63 and 25 c.p. lamps for one year..	Commissioners.
Minn., Rochester.....	10 a.m., June	22..	Furnishing one year's supply of meters and transformers for electric light plant and one voltage regulator.....	Public Utility Board.
Kans., Coldwater.....	1 p.m., June	25..	Constructing electric light plant and water works.....	L. A. Baldwin, City Engr.
S. C., Port Royal.....	June	27..	Furnishing and installing boiler feed water purification system.....	Bureau Yards & Docks, Navy Dept., Washington, D. C.
Ind., Evansville.....	10 a.m., June	29..	Lighting streets with electric arc and incandescent lights for optional period of years.....	Board of Public Works.
Kan., Powhattan.....	About June	30..	Electric light transmission line and distributing system.....	L. C. Christenson, City Clerk
Fla., Punta Gorda.....	June	30..	Fully equipping electric light plant.....	J. F. Corbett, Clk. Bd. Bond Trus.
Man., Winnipeg.....	11 a.m., June	30..	Switchboard and other apparatus for fire alarm office equipment.....	City Electrician
O., Mansfield.....	m., July	1..	Electric street lights for 10 years.....	O. Hursh, Dir. Pub. Serv.
Pa., Lansdale.....	July	1..	Supplying mazda lamps, copper wire, bolts, braces, asbestos, etc.....	Chr., Elec. Light Dept.
Sask., Esteven.....	July	1..	Erecting electrical machinery, generators, three gas en- gines and switchboard.....	G. Dethridge, Town Elec. Engr.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Ia., Dubuque	.....July	2..	Providing changes in plumbing cond't and wiring system.	Superv. Arch., Wash., D. C.
Ariz., Tucson	.....4 p.m., July	6..	60 5-light and 26 1-light ornamental street lighting standards, with globes or bulbs.	L. O. Cowan, City Clerk.
Md., Easton	.....noon, July	8..	Engine, generators and power plant equipment.	C. H. Henry, Sec. Easton Elec. Commission
FIRE EQUIPMENT.				
N. Y., Hudson	.....5 p.m., June	22..	Care and maintenance of fire alarm and police signal system for one year	M. James, City Clk.
Minn., St. Cloud	.....3 p.m., June	21..	Fire house	D. C. Magnuson, City Clk.
Ga., Augusta	.....noon, June	24..	Furnishing triple combination pump and hose wagon.	T. S. Raworth, Chairman Fire Dept. Com.
La., Baton Rouge	.....June	25..	Furnishing motor combination chemical and hose.	A. Grouchy, Comr. Pub. Health
Man., Winnipeg	.....June	30..	Switchboard and apparatus for fire alarm.	Chman. Bd. Control.
Mont., Missoula	.....July	1..	500 feet hose.	L. E. Harris, City Clerk
BRIDGES.				
Ill., Aurora	.....June	20..	Reinforced concrete bridge	Town Clerk.
N. J., Newton	.....June	22..	Girder or Luten reinforced concrete bridge.	Board of Freeholders.
Kan., Wichita	.....June	22..	Three reinforced concrete bridges.	E. B. Moore, Co. Engr.
Wis., Wilson	.....1 p.m., June	22..	Constructing one bridge	Board of Supervisors.
Ont., Toronto	.....noon, June	22..	Reinforced concrete truss bridge.	Frank Barber, Twp. Engr.
Minn., Lake Benton	.....1 p.m., June	22..	Constructing three concrete culverts	E. D. Ehler, Township Clk.
Mo., Independence	.....June	23..	Concrete approaches	County Comrs.
Mo., Kansas City	.....June	23..	Two reinforced concrete approaches	County Court.
N. Y., New York	.....11 a.m., June	23..	For construction of reinforced concrete Ashokan bridge.	Comrs. of Wat. Sup. Board
Neb., Lexington	.....noon, June	25..	Four concrete bridges.	A. S. Gilland, Co. Clerk.
O., Cincinnati	.....June	26..	Concrete bridge	County Comrs.
Ind., Hartford City	.....2 p.m., July	6..	Furnishing all material and constructing a cement concrete culvert	J. Cronin, Jr. Aud. County.
MISCELLANEOUS.				
Conn., Stamford	.....June	22..	Addition to high school building, to cost \$125,000.	Board of Selectmen.
R. I., Providence	.....2.15 p.m., June	22..	Constructing retaining wall.	Bd. of Contract & Supply
N. Y., Brooklyn	.....10.30 a.m., June	22..	Erecting building for marine engine company.	R. Adamson, Fire Comsr.
Pa., Beaver Falls	.....June	23..	Combination street flusher and sprinkler.	W. F. Rayle, City Clerk
D. C., Washington	.....June	23..	Supplying hydraulic motor-driven test pump, 6 dump cars, gravel, stone, bar steel, galvanized sheet steel, yellow pine, etc.	Bureau Supplies & Accts., Washington, D. C.
Mass., Boston	.....3 p.m., June	25..	Mechanical equipment of immigration station. (See proposal ad).	O. Wentworth, Sup. Arch., Wash. D. C.
Ill., Chicago	.....11 a.m., June	25..	Constructing section 2 of Wilson Ave. tunnel.	L. E. McGuire, Comr. P. S.
Ia., Muscatine	.....2.30 p.m., July	8..	Furnishing all material and constructing fireproof City Hall	H. Kern, Mayor.
N. Y., Hudson	.....7.30 p.m., July	22..	Furnishing material and labor for waterproofing old wall and constructing 6-in. reinforced concrete cutoff wall. (See proposal ad)	M. J. O'Hara, City Eng.
Ia., Le Mars	.....3 p.m., July	23..	Constructing complete post office	O. Wenderoth, Sup. Arch., Treasury Dept., Wash., D. C.

STREETS AND ROADS

Bay Minette, Ala.—Meeting of Baldwin County good roads enthusiasts has been held for purpose of organizing county association which would work for betterment of roads throughout county and for legislation which would enable county to issue bonds in sufficient quantities to build roads and to provide for maintenance of them after building.

Decatur, Ala.—City Council has voted \$150,000 appropriation for street improvements.

Sacramento, Cal.—Bids have been opened for construction of 360.9 miles of highway in Northern California, estimated to cost \$330,286. Sections upon which bids were submitted and engineer's estimate on each were as follows: Shasta County, Lamoline to Hazel Creek, 10 miles, \$72,516; Tehama County, Corning to southerly boundary, 8.8 miles, \$87,632; Glenn County, Grapit to northerly boundary, 7 miles, \$62,110; Butte County, Lindo Channel to northerly boundary, 11.2 miles, \$108,027. State Engineering Advisory Board will shortly award contracts on work.

Santa Ana, Cal.—Board of Supervisors has let contract for portion of coast boulevard between Bay City and Sunset Beach. This is first contract let on boulevard, which is planned to reach to Laguna Beach. Bid of Oscar Ford, of Riverside, \$2,700, was accepted. On recommendation of County Highway Commission bid of Richard Rothwell for building Section 4 of Riverside Road was accepted. Bid was \$20,778.80. Section lies in Santa Ana canyon. June 16 was set by Supervisors as time for receiving bids for paving Los Alamitos Road, road running between Los Alamitos and Bay City.

Stockton, Cal.—City council has passed resolution instructing City Engineer Compton to prepare plans and estimates for street improvements that are contemplated after big bond issue election is held.

Tampa, Fla.—Board of county commissioners have decided to advertise sale of remaining \$500,000 bonds of \$1,000,000 issue for brick-paved roads. With this money used county will have brick roads

from its eastern to its western extreme, as well as brick highways in many other directions.

Bloomington, Ill.—Surveys have been completed and plans, profiles and estimates for state aid roads are either completed or in course of preparation in following counties: Rock Island, Peoria, Crawford, Bond, Madison, Monroe, Livingston, Clark, Franklin, Iroquois, DeKalb, Lake, Kane, Ogle, Cass, Adams, Scott, Stephenson, Woodruff, Clark DuPage, Schuyler, Boone, Champaign, Edgar, Stark, Cook, LaSalle, Lee, Henry, Carroll, Marshall, Menard, Lawrence, Sangamon, Saline, Vermillion, Coles and Clay, a total of 107 miles of highway.

Springfield, Ill.—Fifteen thousand miles of improved roads are included in plans of state highway commission for Illinois, realization of which will require many years. Specifications have been sent out to county road superintendents by state department.

It is hoped of commission that county authorities act promptly in order that all contracts for work under consideration may be awarded by July 1.

Allotment of improved roads for each county in state is as follows:

Sangamon, 2,700 feet; 3,100 feet, 2,800 feet, 2,600 feet, 2,900 feet; Cook, 7,111 feet, 2,623 feet; Peoria, 6,159 feet; Franklin, 4,378 feet; Coles, 7,200 feet; Crawford, 18,048.8 feet; Clark, 4,506 feet; Bond, 1,575 feet; Iroquois, 13,000 feet, 13,306 feet; Livingston, 12,429 feet; Edgar, 4,500 feet, 4,200 feet; Champaign, 6,600 feet, 5,700 feet, 6,160 feet; Vermillion, 11,700 feet; Monroe, 1,900 feet; Lake, 10,600 feet; Schuyler, 5,400 feet; Eagle, 8,500 feet.

Sterling, Ill.—Sixteen thousand six hundred dollars is to be spent on Lincoln Highway in Whiteside County if possible, and in addition to this sum Lincoln Highway Association will present to County of Whiteside 2,000 barrels of cement, valued at \$2,000, making total amount for the Lincoln Highway \$18,600.

Huntington, Ind.—Negotiations for oiling streets in Roanoke and Andrews are in progress. Councils of each town are considering improvement to thoroughfares and contracts will be let in short time for improvement.

Muncie, Ind.—Members of special committee of council have instructed City

Engineer Deardorff to prepare plans and specifications for construction of cement sidewalk in Brotherton St. from Ohio Ave. to Dudley St.

Dubuque, Ia.—City will improve 20th St. and Rhomburg Ave. It is estimated by city engineer that said improvement will require: 23,679 sq. yds. of concrete outside of tracks; 6,461 sq. yds. brick block paving inside of tracks and 1 ft. outside; 1,000 lin. ft. of stone curb reset; 1,500 lin. ft. of new stone curb; making a total estimated cost to abutting property owners of \$53,000; 23,679 sq. yds. creosote wood block paving; 6,461 sq. yds. creosote wood block paving inside of tracks and 1 ft. outside; 1,000 lin. ft. of stone curb reset; 1,500 lin. ft. of new stone curb, making total estimated cost to the abutting property owners of \$82,465; 23,679 sq. yds. asphalt macadam outside of tracks; 6,461 sq. yds. brick paving inside of tracks and 1 ft. outside; 1,000 lin. ft. of stone curb reset; 1,500 lin. ft. of new stone curb, making a total estimated cost to the abutting property owners of \$53,000; 23,679 sq. yds. brick block paving outside of tracks; 6,461 sq. yds. brick block paving inside of tracks and 1 ft. outside; 1,000 lin. ft. of stone curb reset; 1,500 lin. ft. of new stone curb, making a total estimated cost to the abutting property owners of \$69,700; 23,679 sq. yds. asphalt concrete outside of tracks; 6,461 sq. yds. brick paving inside of tracks and 1 ft. outside; 1,000 lin. ft. of stone curb reset; 1,500 lin. ft. of new stone curb, making a total estimated cost to the abutting property owners of \$62,020. J. J. Shea is City Recorder.

Baton Rouge, La.—Bids will be received until June 25 by President Police Jury for \$186,000 county good road bonds.

Boston, Mass.—About \$100,000 will be spent on constructing granolithic sidewalks.

Haverhill, Mass.—City Engineer Lawton has prepared plans and specifications of macadam work which city proposes to do on number of streets and they will be sent to state highway commission for its approval, as is necessary where macadam work is contemplated.

Streets included in list are Boardman street, Johnson street, Dudley street, Mill street, Summit avenue, Lawrence

street, Prospect street, Bradford district; Sheridan street, Westland terrace and Newcomb street.

Swampscott, Mass.—Bonds in sum of \$50,000 for streets have been sold to Estabrook & Co.

Duluth, Minn.—Permanent improvement of International and Pike River roads, highways which link together two great iron ranges of St. Louis county and serve hundreds of farmers in connecting country, is being strongly urged.

Duluth, Minn.—Appropriation of \$5,000 has been made by County Board to be used in making improvements on International and Pike River roads, highways leading north out of Virginia. The International Road is otherwise known as State Highway No. 1 and county will be reimbursed from \$50,000 fund set aside by State for money spent on its improvement. Other road appropriations made were: Fifth Commissioner's District, \$4,020, divided as follows: Industrial Road, \$500; Gowan-Prairie Road, \$400; Lakka Road, \$20; Payne and Whiteface Road, \$1,000; Arnold Road, \$800, and Graff Road, \$1,300. Sixth District, \$5,900, divided as follows: Embarrass and Pike River Road, \$2,000; Tower and Embarrass Road, \$600; Lamppa Road, \$600; Neli-mark Road, \$300; Old Vermilion Road, \$2,000.

Las Cruces, N. M.—On June 13 County will vote on \$50,000 bond issue for road purposes.

Cranford, N. J.—Township Committee has decided to improve Union Ave., between Alden St. and Rahway River.

Elizabeth, N. J.—Ordinance to resurface several telford streets has passed City Council on two readings, and shortly after notices of intention to repave Elizabeth Ave. and Broad St. at expense of abutting property owners and the city have been ordered published.

New Brunswick, N. J.—Ordinances have been passed for regulating grading and paving of various streets. E. J. McMurtrey is City Clerk.

Paterson, N. J.—Main street, between this city and Passaic, will be paved with granite blocks.

Trenton, N. J.—Ordinances have been passed providing for paving of various streets. Frank Thompson is City Clerk.

Middletown, N. Y.—Board of Estimate and Apportionment has been empowered to obtain plans for repairs to Highland avenue, and to advertise for bids from contractors, the work to be guaranteed for three years.

Niagara Falls, N. Y.—Common Council has approved of over \$150,000 worth of new pavements, and authorized sale of \$10,000 worth of 5 per cent. certificates of indebtedness to pay for street intersections.

Schenectady, N. Y.—Bids will be received until 11 a. m., June 23, for purchase of \$8,000 highway bonds. J. F. Hooker is City Comptroller.

Kinston, N. C.—County Commissioners of Green county have completed negotiations for sale of \$100,000 of township road bonds voted several months ago.

Wilmington, N. C.—Citizens of Northwest township, have voted in favor of bond issue in sum of \$15,000 for purpose of improving and constructing modern improved highway between Brunswick river and Acme, thus assuring that eastern end of proposed Wilmington-Charlotte automobile highway will soon be a reality.

Cincinnati, O.—County Surveyor Cowen has reported to County Commissioners that he finds after making survey of New Richmond pike that retaining walls are necessary and cost of permanent improvement of road will run from \$175,000 to \$275,000. Mr. Cowen will prepare estimate and plans without retaining walls.

Cincinnati, O.—Plans and specifications for repair of Blue Rock pike at estimated cost of \$4,281 and of Harrison and New Haven pike at estimated cost of \$4,756, have been approved. Surveyor Cowen was authorized to expend not exceeding \$2,000 for labor, material and teams in repair of Montgomery pike.

Hood River, Ore.—Question of bond issue for opening Columbia River Highway through this county will undoubtedly be submitted to vote of people in near future.

Boyetown, Pa.—Borough Council has voted \$10,000 for street improvements.

Williamsport, Pa.—The Montoursville state road from Miller's lane, end of brick pavement, to Loyalsock creek bridge has been surveyed by corp of engineers under supervision of S. P. Longstreet and C. L. Lorch, of state department with headquarters at Wellsboro. It is understood that bids have

been asked for resurfacing of this portion of state road.

North Smithfield, R. I.—Sum of \$2,000 has been voted for macadamizing of part of highway from point near New York, New Haven and Hartford Railroad, leading through village of Slatersville northwesterly to point opposite the Postoffice in village of Slatersville.

Woonsocket, R. I.—Advertising for bids for work of paving North Main St. and part of Winter St. with granite paving blocks has been authorized by Aldermanic Committee on Streets and Bridges. Committee will open bids on Saturday evening, June 20, at 8 o'clock. Specifications call for granite block paving on concrete foundation.

Coalfield, Tenn.—Citizens have voted in favor of \$270,000 road bonds.

Denison, Tex.—Bonds in sum of \$25,000 have been voted for permanent street improvements.

McKinney, Tex.—Collin County Commissioners have accepted bid of J. Fred Smith of Dallas for \$125,000 Celina good roads bond issue, Mr. Smith agreeing to pay par and accrued interest, latter amounting to about \$525. It is expected that work in the Celina district will begin in ten days.

Snyder, Tex.—County Judge Buchanan has sold through local bank entire \$50,000 issue of Scurry County road bonds at par and accrued interest.

Sherman, Tex.—The Sherman City Council has instructed City Secretary Henry Zimmerman to advertise for paving of East Lamar St. from Throckmorton St. to Grand Ave., West Lamar St. from court house square to Lincoln St., North Walnut St. from Brockett to the Robert E. Lee school building, King St. from Travis to Crockett St., Pecan St. from Walnut to Branch, North Walnut St. between Mulberry and Houston Sts.; Montgomery St. and Lamar to Rosedale. This makes addition of four and nine-tenths miles of street to be paved in this city.

Wharton, Tex.—Work is shortly to begin on good roads of Wharton County precinct No. 1. Bonds ordered sold of \$300,000 have been executed and forfeit money put up by purchasers, Cutter, May & Co., of Chicago.

Ogden, Utah.—City recorder is instructed to publish notices to contractors calling for bids for paving of Eccles Ave., between 25th and 26th Sts., and 24th St. from Washington to Grant Aves.

Charleston, W. Va.—Citizens have voted \$465,000 bonds for road and sewer improvements. Bids for same will be received June 23 by Bd. of City Affairs. J. F. Bedell is Mayor.

Seattle, Wash.—The long needed improvement of East Pike St., from Broadway to East Madison St., by paving has been ordered by Council.

CONTRACTS AWARDED.

Los Angeles, Cal.—For paving as follows: Asphalt on University Ave. to B. F. Ford, at \$19,668; asphalt on St. Andrews Pl. to Fairchild-Gilmore-Wilton Co., Pacific Electric Bldg., \$19,795, and for Wilmer St. to Barber Asphalt Paving Co., Los Angeles, at \$11,688.

Richmond, Cal.—To Moffett & Meade, of Oakland, contract for completing final portion of municipal highway from tunnel at \$75,000.

Bridgeport, Conn.—Contracts for laying of warrenite pavement on several of streets of the city have been awarded to Warren Brothers of Boston. City will pay \$1.20 a sq. yd. for pavements, which is same price as that paid last year, and is same as price paid for warrenite by State Highway Commissioner. It is expected that the cost of the work, for which Director of Public Works J. A. Courtade has awarded contracts, will be about \$160,000, and money with which to pay for pavements will be taken from bond issue of \$200,000 authorized at special election of May 16. Bids for laying of 3,500 sq. ft. of cement sidewalks and 100 lin. ft. of gutters and sidewalks at Seaside and Beardsley parks have been opened by Board of Contract and Supply. Only two bids were submitted. They were: The Wolf Construction Co., cement sidewalks complete with excavating and grading, 14 cts. a sq. ft.; curbs and gutters complete, 70 cts. a lin. ft. Paul Svihra & Sons, cement sidewalks complete with excavations and gradings, 12½ cts. a sq. ft.; curbs and gutters complete, 75 cts. a lin. ft.

Bridgeport, Conn.—Bids for sidewalks at Beardsley and Seaside Parks have been opened by George L. Catlin, clerk of Board of Contract and Supply. There were but two proposals. Award will probably be made to Paul Svihra, of Bridgeport, who did the work last year.

Contract calls for 3,500 sq. ft. of concrete walk and 100 running feet of curb and gutter. The bidders and the prices submitted were as follows: The Wolfe Concrete Construction Co., sidewalks at 14 cts. per sq. ft., and curb and gutters at 70 cts. per running ft., and Paul Svihra & Sons, sidewalks at 12½ cts. per sq. ft. and curb gutters at 75 cts. per running ft.

Jacksonville, Fla.—Contracts amounting to over \$25,000 in all for paving of Jacksonville streets with asphaltic concrete have been awarded to Atlantic Bitulithic Co., of Richmond, Va. Contracts awarded call for laying of more than 13,000 sq. yds. of asphaltic concrete on Riverside Ave. and Church St. While these contracts call for some \$18,000 worth of work, when laying of pavement between street car tracks is added, total will considerably exceed \$25,000. This modern paving will be laid on Riverside Ave. from viaduct to Lackawanna Ave., a distance of some six blocks.

Bloomington, Ill.—Bids have been received on general sidewalk contract for present fiscal year. George Bansau being low bidder. His bid was 8½ cents for walks of four-inch depth and 10½ cents for six-inch walks. The bid of H. Berenz & Sons was 9½ and 12 cents for the above walks and that of Davis Ewing Company 9½ and 13 cents.

Rosemond, Ill.—By Highway Comrs., Rosemond Township, for improving Robt. Little Rd., ¾ miles in length, requiring 29,000 sq. yds. vitr. brick pavement, 34,000 lin. ft. curb, 296 lin. ft. concrete culverts, 3 reinforced concrete bridges, to Louis Rich, 1703 Wiemann Ave., East St. Louis, Ill., at \$55,620.

Springfield, Ill.—For brick pavement in Mason St. to J. E. Bretz at \$1.62 pr. sq. yd. for pavement, 55 cts. pr. lin. ft. for sand stone curb.

Lafayette, Ind.—The Western Construction Co., of Lafayette, has been granted contract for improvement of State St. and North and South Ellsworth Sts. at meeting of Town Trustees. Contract price is \$3,480. State St. is to be paved with creosote wood blocks, same as on new Main St. levee. North and South Ellsworth Sts. are to be improved with gravel.

Cedar Rapids, Ia.—For 8,100 sq. yds. concrete pavement by City Council to Percy Smith at \$11,937.

Vinton, Ia.—For paving with brick Main St. to F. K. Hahn, Cedar Rapids, at \$1.85 per sq. yd.

Portland, Me.—Several miles of State highway have been let out for construction by State Highway Commission. These included Waldoboro Sections 1 and 2, Trenton Sections 1, 2 and 3, and the Monmouth Section. Bids also were open for sections of State Road in towns of Greene, Winthrop and Leeds, but the bids were higher than estimates of State Highway Department, and the Commission decided to do work itself in these three towns. Waldoboro Section No. 1 was awarded to A. D. Bridges, Hazzardville, Conn., \$21,960.91. Waldoboro Section No. 2 was awarded to Ahern Construction Co., Willimantic, Conn., \$22,748.85. Trenton Section No. 2 was awarded to A. Williams & Co., Boston, Mass., \$10,546.70. Trenton Section No. 2 was awarded to A. Williams & Co., Boston, Mass., \$13,294.63. Trenton Section No. 3 was awarded to A. Williams & Co., Boston, Mass., \$10,505.97. Monmouth Section was awarded to R. G. Miller Co., Hartford, Conn., \$28,684.40. Following is a complete list of the bidders for the different sections: Waldoboro Section No. 1—R. G. Miller, Hartford, Conn., \$23,057.95; A. D. Bridges Sons, Hazzardville, Conn., \$21,960.91. Waldoboro Section No. 2—R. G. Miller, Hartford, Conn., \$22,879.65; A. D. Bridges Sons, Hazzardville, Conn., \$25,564.60; Ahern Cons. Co., Willimantic, Conn., \$22,748.85. Trenton Section No. 1—A. Williams & Co., Boston, Mass., \$10,540.70; J. H. Stalford, Bar Harbor, \$19,731.20; Small & Ingalls, Bar Harbor, \$18,985.75; M. C. Morrison & L. B. Googins, Bar Harbor, \$15,264.27. Trenton Section No. 2—A. Williams & Co., Boston, Mass., \$13,294.63; Alternate bid, \$16,820.43; J. H. Stalford, Bar Harbor, \$23,513.14; Alternate bid, \$21,522.10; Small & Ingalls, Bar Harbor, \$21,853.75; Alternate bid, \$21,321.55. Trenton Section No. 3—A. Williams & Co., Boston, Mass., \$10,505.97; J. H. Stalford, Bar Harbor, \$16,182.46; Small & Ingalls (informal), \$14,862.20. Monmouth—R. G. Miller Co., Hartford, Conn., \$28,684.40; A. D. Bridges, Hazzardville, Conn., \$45,260.70; Forgiione & Romano, South Portland, Me., \$38,627.50. Greene—R. R. Miller, Hartford, Conn., \$16,695.30; Forgiione & Romano Co., South Portland, Me., \$19,559.15. Winthrop—R. G. Miller, Hartford, Conn., \$10,902.93; A. D. Bridges, Hazzardville, Conn., \$12,652.92; Forgiione

& Romano Co., South Portland, \$14,558.50. Leeds—R. G. Miller Co., Hartford, Conn., \$11,672.90; Forgione & Romano Co., South Portland, \$13,369.40.

Clearspring, Md.—To Hollinger & Dennis, contract for mile of road between Clearspring and Williamsport, at \$2,590.

Hagerstown, Md.—Contract has been let for construction of mile of road in Keedysville district to Bester & Long at bid of \$1,790. Bester & Long, Hagerstown, Md., were also awarded contract for construction of road from Hagerstown to paper mill road at bid of \$1,840.

Crookston, Minn.—For 10,000 ft. road work to B. E. Morgan, St. Cloud, at \$500 per mile. H. J. Welts is County Aud.

Duluth, Minn.—By City Council, contract for improvement of Vermillion Rd. to Rogers & McLean on their bid of \$53,915.55 for one-course reinforced concrete. Highway will be paved from Fifth St. to Ontario St., and is last large street job scheduled for this year.

Millburn, N. J.—By Township Committee for rebuilding Main St. with amiesite type of pavement to John Docer, of Irvington, at \$29,000.

New Brunswick, N. J.—Three contracts have been awarded by Board of Freeholders at their regular monthly meeting. The Monmouth Contracting Company, Red Bank, N. J., was awarded contract for repairing of Applegarth-Clarksburg road, their bid of \$3,906.14 being lowest.

Contractors Rhoades & Mendel, of Elizabeth, contract for making repairs to trestle of Perth Amboy bridge. Bid of this firm was \$450.

William J. Donnell, of Perth Amboy, contract for furnishing of stringers and other lumber for repairs to Perth Amboy bridge at \$30 per thousand feet.

Passaic, N. J.—Resolution has been passed by Board of Commissioners of Township of Union authorizing execution of contract for oiling of streets with Standard Oil Co.

Albany, N. Y.—Lowest bids received by State Highway Commission at Albany, N. Y., on Monday, June 8, 1914, for construction of public highways by State aid are as follows: Road No. 5476, Belmont-Scio, Allegany County, 4.64 miles, S. T. Benson & Co., Jamestown, N. Y., \$88,978.20. Road No. 5481, Wells-ville-Andover, Allegany County, 7.18 miles, McLaughlin & Burchill, Syracuse, N. Y., \$82,301.51. Road No. 5452, Irving-Silver Creek, Chautauqua County, 3.53 miles, Barrally & Ingersoll, Rochester, N. Y., \$73,077. Road No. 5485, Mooers Forks-Ellenbergs Depot, Clinton County, 9.63 miles, Spellman-Oliver Co., Chateaugay, N. Y., \$96,912. Road No. 5484, Amenia-Delavergne Hill, Dutchess County, 2.09 miles, James Garafano & Son, Inc., Mt. Vernon, N. Y., \$32,809. Road No. 1182, Cape Vincent-Watertown, Pt. 2, Jefferson County, 8.36 miles, Guy H. Miller, Watertown, N. Y., \$76,680. Road No. 1187, Rush-Mendon, Pt. 2, Monroe County, 3.85 miles, Town of Mendon, Mendon, N. Y., \$20,141. Road No. 5480, Highland Lake-Montgomery, Orange County, 1.87 miles, Henry McNamee, Eddyville, N. Y., \$53,381.60. Road No. 1183, Round Lake-Maltaville, Saratoga County, 1.16 miles, John E. Dower, Ballston Spa, N. Y., \$12,220.30. Road No. 1190, Watkins-Salt Point, Schuyler County, 1.11 miles, John W. Gurnett, Watkins, N. Y., \$9,866.25. Road No. 1003-A, Mitchell St.-East Town Line, Tompkins Co., 0.20 mile, Patrick D. Conway, Ithaca, N. Y., \$2,002.50. Road No. 1188, Croton-Cayuga County Line, Tompkins County, 2.77 miles, McLaughlin & Burchill, Syracuse, N. Y., \$40,614.06.

Lowest bids received by State Highway Commission at Albany, N. Y., for repair of public highways by State aid, on Monday, June 8, 1914, are as follows: Rep. Con. No. 627, Road No. 801, East Rushford-Gordonville Bridge, Allegany County, Wood & Tompkins, Hilton, N. Y., \$13,613.39. Rep. Con. No. 605, Road No. 592, Auburn-Eldridge, Cayuga County, Edw. F. Brayer, Auburn, N. Y., \$14,816.82. Rep. Con. No. 655, Road No. 249, Old Plank, Fulton County, Flood & Van Wirt, Hudson Falls, N. Y., \$16,824. Rep. Con. No. 656, Road No. 726, Chittenango-Oneida, Pt. 2, No. 5014, Chittenango-Oneida, Pt. 1, Madison County, De Barber & Hill, Fulton, N. Y., \$7,397.25. Rep. Con. No. 636, Road No. 98, Webster, Section 1; No. 100, Webster, Section 3; No. 99, Webster, Section 2, Monroe County, Dale Engineering Co., Utica, N. Y., \$5,245.508. Rep. Con. No. 635, Road No. 79, Scottville, Section 2; No. 255, Chilli, Section 2; No. 252, Clifton, Section 2; No. 402, Buffalo, Section 3, Monroe County, Dale Engineering Co., Utica, N. Y., \$10,737.92. Rep. Con. No. 634, Road No. 253, Lyons; No. 254, Chilli, Section 1, Monroe County, Brooks & Julian, Rochester, N. Y., \$4,

082,359. Rep. Con. No. 653, Road No. 898, East Norwich-Memorial Cemetery, Nassau County, Geo. B. Powers, Oyster Bay, N. Y., \$1,609.14. Rep. Con. No. 659, Road No. 434, Anandale-Bay View, Nassau County, Wm. R. Bross, Babylon, N. Y., \$946.90. Rep. Con. No. 595, Road No. 271, Utica-Oneida Castle, Part 1; No. 5034, Vernon Village-Oneida Castle, Oneida County, Nash & Griffin, Norwich, N. Y., \$2,669.15. Rep. Con. No. 591, Road No. 5139, Camden-Taberg, Pt. 2, Oneida County, Newport Construction Co., Herkimer, N. Y., \$7,217.52. Rep. Con. No. 609, Road No. 49, Fabius-Apulia, Sec. 1; No. 75, Fabius-Apulia, Sec. 2; No. 121, Fabius-Apulia, Sec. 3; No. 489, Tully; No. 554, Fabius, Onondaga County, John Johnson Construction Co., Buffalo, N. Y., \$17,743.53. Rep. Con. No. 654, Road No. 282, Greenville-Slate Hill; No. 283, Greenville-Port Jervis, Orange County, Schunemunk Construction Co., Highland Mills, N. Y., \$14,963.30. Rep. Con. No. 639, Road No. 387, Five Corners-Kuckville, Sec. 2; No. 392, Oak Orchard, Sec. 1; No. 389, Maple Ridge, Sec. 1; No. 390, Maple Ridge, Sec. 2, Orleans County, Hammond Tracey Construction Co., Middleport, N. Y., \$9,713.53. Rep. Con. No. 619, Road No. 90, Grassy Point; No. 5165, Long Clove-Haverstraw; No. 5002, Congers-Long Clove; No. 689, Springdale-Knapps Cors., Rockland County, Henry McNamee, Eddyville, N. Y., \$8,543.45. Rep. Con. No. 601, Road No. 73, Quaker St., Schenectady County, J. J. Malloy, Schenectady, N. Y., \$4,318.55. Rep. Con. No. 652, Road No. 912, Port Jefferson-Coram, Suffolk County, Wm. R. Bross, Babylon, N. Y., \$3,192.74. Rep. Con. No. 626, Road No. 616, Trumansburg-Ithaca, Tompkins County, Wm. Hazard, Trumansburg, \$17,987.18. Rep. Con. No. 623, Road No. 148, Pines Bridge-Yorktown Heights; No. 149, Yorktown Heights-Putnam County Line; No. 331, Peekskill-Salem Center, Sec. 31; No. 332, Peekskill-Salem Center, Sec. 4; No. 405, Kitchawan-Croton Lake, Westchester County, John F. Donovan, Saugerties, N. Y., \$23,184.75. Rep. Con. No. 625, for sweeping, furnishing, and applying oil in Franklin County (Highways Nos. 884, 950, 5076) and Lewis County (Highway No. 937), Spellman-Oliver Co., Chateaugay, N. Y., \$0.035 per sq. yd. Rep. Con. No. 628, for sweeping, furnishing and applying high carbon tar in Lewis County (Highway No. 5327), and St. Lawrence County (Highway No. 876), Defiance Corporation, Ticonderoga, N. Y., \$0.045 per sq. yd.

Saranac Lake, N. Y.—For paving and sidewalk work on Margaret and Circle streets and Park avenue, to J. Hubert Stevens of Lake Placid, and C. P. Rumpf of Saranac Lake, at \$8,189.48.

Schenectady, N. Y.—Contract for repairing of Front St. pavement has been awarded to Union Paving Co., it being lowest bidder.

Watertown, N. Y.—Guy H. Miller of this city was low bidder among six contractors for building part two of state highway from Watertown to Cape Vincent. Distance is 8.36 miles in length. Bid of Mr. Miller was \$76,680.

Other bids as follows: Burns Brothers & Haley, Watertown, \$85,968; Chambers & Barnes, Rochester, \$83,160; Wood & Tompkins, Hilton, \$79,805.40; Burns & McConville, Ogdensburg, \$77,469.50; Thomas O'Brien, Watertown, \$79,264.

Amherst, N. S.—For paving Church and Albion Sts., to Fage & Lusby, Amherst, as follows: 11,283 sq. yds. reinforced concrete pavt., \$1.90; 200 sq. yds. extra reinforcing, 15 cts.; 8,240 lin. ft. 3-in. tile drain, 14 cts.; 8,240 lin. ft. 6x16-in. curb, 40 cts.; 4,000 sq. yds. concrete sidewalks, \$1.19.

Dayton, O.—Bids have been opened for contracts for sprinkling number of streets in city with oil. There were but two bidders. Max Whitmore made proposal of 3½ cts. per sq. yd. or 3¼ cts. per sq. yd., providing there is no red lighting or blockading to be done. J. B. Coleman submitted same bid.

Sioux Falls, S. D.—For paving of South Phillips avenue between Thirtieth and Eighteenth streets, to Michael and Arthur Fanebust, for Fanebust Bros. Construction Co.

Specifications provide for six inches of tarvia macadam preparation on base of crushed stone.

Dayton, O.—Swank & McIntyre, local firm of contractors, was awarded contract for paving Dayton-Cincinnati pike of brick, by State Highway Commissioner Marker. Their bid was lowest, being \$43,000. Distance to be paved is 2.49 miles, with a roadway 14 ft. wide. Other bidders on this job, with their proposals, are: R. A. McCutchen, Franklin, O., at \$45,800; Clifton Hollihan, of Dayton, at \$45,524; Gepbart & Kline, of Dayton, at

\$44,448, and McKoy Bros. & Keller, of Jackson, O., at \$45,020.

Chester, Pa.—City Council has awarded contracts for paving city streets to Union Paving Co. at their individual bids. Material to be used is Filbertine, and work will be commenced as soon as possible.

Harrisburg, Pa.—The Central Supply and Construction Co. and Standard Bitulithic Co. split nearly even on awards for paving more than 33,000 sq. yds. of borough street made by Council. Central company will pave South Second St. and Harrisburg streets with asphalt at \$2.01 per sq. yd. and will lay concrete curb at 42 cts. a foot. Total yardage of paved surface on these streets will be 17,165 with 9,536 ft. of curb. This company will build catch basins at \$36 each and lay 12 in. terra cotta pipe at 80 cts. per ft. The Standard Bitulithic Co. with warrenite will pave South Front St., from Highland St. to old borough line, and Chambers, Hoffer, Dupont, Highland and Washington Sts., between Front and Second Sts. This company's contract will include 16,224 sq. yds. of warrenite at \$2.12 per sq. yd., 8,205 ft. of concrete curb at 44 cts. per ft., catch basins at \$60 each and 12 in. pipe at \$1. Harrisburg Railways Co. will pave its share of these streets with wood block amounting to about 10,000 sq. yds.

Waynesboro, Pa.—Three bids have been opened for curbing for West Main St. extension paving. Bid of H. B. Baker was lowest and was accepted. His price is 49 cts. per ft. for straight curbing, 61 cts. per ft. for reinforced curbing, 52 cts. for curved curbing and 72 cts. for curved curbing reinforced with Wainwright bars.

Williamsburg, Pa.—For paving to Standard Cont. Co., Altoona, as follows: Front and Canal Sts., Patterson brick, for \$12,544; Plum St., reinforced concrete, 2 course, \$4,465; and West 3d St., \$10,396. Engineer, J. Luden Henry, Walsh Bldg., Hallidaysburg.

Houston, Tex.—Paving of six streets will commence shortly. The streets to be paved, the name of the contractors and the kind of material to be used follows:

Robin, from Smith to Heiner; Eureka Construction Company, Houston, Texas; vertical fibre brick.

Louisiana, from Dallas to Capitol; Uvalde Cock Asphalt Company; Uvalde rock asphalt.

Wilson, from San Filipe to Andrew; Eureka Construction Company, Houston, Texas; vertical fibre brick.

Holman, from Main to Crawford; Roach-Manigan Paving Company, Fort Worth, Texas; wood block.

Austin, from Franklin to International and Great Northern tracks; Horton & Horton; vertical fibre brick.

Andrew, from Heiner to Wilson; Eureka Construction Company, Houston, Texas; vertical fibre brick.

San Antonio, Tex.—Roach-Manigan Paving Company, Fort Worth, Tex., contract by City Council to pave Commerce street from Main Plaza to Alamo street with 3½-inch creosoted wood blocks at \$2.96 a square yard complete. This bid is by far lowest ever submitted in San Antonio for creosoted blocks. It is 12 cents a square yard less than heretofore low bid on creosoted wood blocks submitted by Texas Bitulithic Company May 7 for Travis and Navarro streets. Three bids were submitted to the Council, Rushmore & Gowdy bid \$2.15 for blocks alone, Texas Bitulithic Company bid \$2.12 and Roach-Manigan bid \$2.07. Roach-Manigan was low not only in topping, but in excavating, curbing and foundation. For concrete foundation of 1-3-6 mixture their price was \$5 a cubic yard. For excavating their bid was 65 cents, and for curbing 44 cents a lineal foot.

Temple, Tex.—See & Smith, a new engineering firm of this city, has been awarded contract for engineering and supervision of construction over 30 miles of graveled roads to be constructed in Holland Rd. district of Bell county from proceeds of bond issue of \$150,000 voted for purpose.

Salt Lake City, Utah.—By City Com. contracts as follows: Curbs and gutters on territory from 11th East to Mt. Olivet Cemetery, from 3d to 9th South Sts., to G. A. Gilkerson, at \$68,442, and cement sidewalks territory west of Jordan River and between 1st and 5th South Sts., to G. A. Heman, \$17,347.

Bellaire, W. Va.—Contract for paving of National Road from St. Clairsville to Fairview has been let to Adams Bros. Co., of Zanesville, by State Highway Commission. Their bid for contract was \$418,000, and work will be completed in eighteen months.

Rosalie, Wash.—By State Highway Bd., Olympia, for improving 8.7 miles of Inland Empire Highway between Rosalia and Cashup to Andrus & Maginnis, Portland, Ore. W. R. Roy is Highway Commissioner.

Seattle, Wash.—Bids for Permanent Highway No. 1 B. opened June 1, 1914, and taken under advisement until this date, were again taken up and contract awarded to L. R. Ellis for No. 2 brick, 5 concrete base and 5-year maintenance, at the sum of \$41,435.

Superior, Wis.—Board of Public Works has opened bids and awarded contracts for construction of cement sidewalks in different parts of city. Approximately 200,000 sq. ft. of sidewalk will be built under contracts awarded, length being 8 miles. Contracts were awarded as follows: Baum & Jacobs, 11 cents per sq. ft., First and Second Wards; Magnus Peterson, 12 cents per sq. ft., Eighth Ward; Johnson & Swanson, 11½ cents per sq. ft., Second Ward; Ed. Johnson, 10 1-15 cents per sq. ft., Seventh Ward; Berg & Runsten, 10½ cents per sq. ft. Third and Fifth Wards.

SEWERAGE

San Francisco, Cal.—City Engineer's specifications for outlet sewer at Baker's Beach have been approved; cost estimated at \$20,000.

San Francisco, Cal.—Unsanitary conditions call for construction of sewers on Short, Eagle, Groveland and Yukon Sts., where there are about 60 houses. A right of way for main sewer from Yukon St. to Caselli Ave. will have to be purchased.

Peoria, Ill.—Bids will shortly be called for construction of No. 1 sewer, estimated at \$32,000, and bids for lower end sewer, to cost \$30,000, will be called for in about 3 months. L. D. Jeffries is City Engineer.

Topeka, Kan.—Sewer is to be built in North Topeka between North Jackson, North Van Buren, Grant and St. John Sts., according to resolution passed by City Commission.

Haverhill, Mass.—Construction of sewer to relieve conditions at city water supply at Kenos Lake is recommended; estimated cost \$15,000.

Lawrence, Mass.—At regular session of Municipal Council order providing for appropriation of \$1,500 for a storm water sewer in Jackson St., from Logan St., 1,500 ft. northerly toward Methuen line to carry off surface water from property abutting Jackson St. was passed by vote of 3 to 2.

Kalamazoo, Mich.—Laying of new lateral sewers to cost \$25,000 has been approved by City Council.

Madison, N. J.—Sewer bonds in sum of \$55,000 have been awarded to J. D. Everett & Co., of New York.

New Brunswick, N. J.—Common Council has authorized execution of contract between this city and Borough of Milltown for carrying out plans of Advisory Commissions on Sewage Disposal from two municipalities. Provision will be made in contract for inspector to represent this city on work of construction and New Brunswick is to pay \$12,500 toward cost of pumping station to be erected in Milltown. Total cost, including laying of 12-in. pipes on streets of Milltown and on road leading to this city, is estimated at \$52,000. Milltown sewage will be pumped to point near Musical String Factory, where it will flow into New Brunswick's sewer pipes and from that point will be taken care of by this city. Annual cost of maintaining pumping system is estimated at \$2,000, all of which is to be borne by Milltown.

Perth Amboy, N. J.—Ordinances have been passed for construction of 12 in. pipe sewer in Johnstone and Jaques Sts., and 10 in. pipe sewer in Donald Ave. W. La Roe is City Clerk.

Trenton, N. J.—Ordinances have been adopted for construction of various sewers as follows: No. 603 in Roebbling Ave., No. 592 in Adam Ave., No. 597 in Dale St. and No. 599 in North Cook Ave. Frank Thompson is City Clerk.

Huntington, L. I., N. Y.—Petitions of citizens of this town for creation of proposed new sewer district has been presented to Town Board.

Niagara Falls, N. Y.—Bids will be received by Board of Estimate and Apportionment up to 10 a. m., June 19, for purchase of sewer bonds in sum of \$112,800. Thos H. Hogan is City Clk.

Rome, N. Y.—Question of sewage disposal plant is being considered.

Schenectady, N. Y.—Bids will be received by J. F. Hooker, City Comptroller, until the 23d day of June, 1914, at 11 o'clock a. m., for purchase of \$300,000

sewer registered bonds of City of Schenectady, New York.

Portland, Ore.—Bids for Rhine St. extension of Brooklyn district sewer have been received by Council and referred to Commissioner Dieck for tabulation and report. They follow: William Lind, \$108,599; James Kennedy, \$126,717; Giebisch & Joplin, \$127,366; Jeffery & Buff-ton, \$117,266; Elliott Contracting Co., \$123,129; J. F. Shea, \$122,791; Peninsula Sand & Gravel Co., \$126,185. This is last large branch of Brooklyn district sewer constructed seven years ago, and it is designed to serve large district east of Brooklyn.

Connellsville, Pa.—South Connellsville Town Council has decided to have survey made of town with view to erecting sewage system. It is estimated that sewers can be laid throughout town for less than \$30,000.

Ellwood City, Pa.—Committee on streets and sewers of Boro Council has ordered building of several sewers. Permission will be asked from Beaver County for ditch to be constructed along Beaver and Lawrence County line, to take care of drainage from hillside to south of town.

Hazleton, Pa.—A \$2,400 relief sewer must be built at Hazleton to carry off excess drainage damaging one of trunk lines.

Pittsburgh, Pa.—N. S. Sprague, Superintendent of Pittsburgh Bureau of Engineering, has been instructed to make plans for sanitary sewer of Nine-Mile Run District and to estimate proportionate cost to city and to each borough and township affected.

Woonsocket, R. I.—Resolution appropriating \$23,633 for sewer construction in Fairmount district has been passed in concurrence at regular meeting of Board of Aldermen. Sewers will be built as follows: First Ave., from Chestnut St. to Olo St.; Second Ave., from Chestnut St. to crown of hill south of Olo St.; Third Ave., from crown of hill south of Olo St., to Chestnut St.; Fourth Ave., from Chestnut St. to crown of hill south of Olo St.; in right of way from Blackstone River to First Ave.; to Third Ave.; Fairmount St., from Third Ave. to Fourth Ave.; Olo St., from First to Third Ave.

Waltham, S. C.—Town Council has set July 7 as date for voting on \$12,000 bond issue for sewerage system.

Brenham, Tex.—Taxpayers of Brenham, Mayor and members of City Council had meeting for purpose of discussing advisability of issuing bonds to extent of \$30,000 for public improvements—\$15,000 for sewer extension work and other \$15,000 to extend and improve water works system. Council tentatively agreed to order special election for that purpose at its next regular meeting.

Dallas, Tex.—Another large municipal project, the erection of sewage disposal plant, probably will be gotten under way during present summer, according to announcement by City Water and Sewerage Commissioner R. R. Nelms. Bids on construction of disposal plant will be asked for within 30 days. Final details of plans for plant have been worked out by James H. Fuertes, the expert who designed it.

Seattle, Wash.—Preliminary plans for new sewer system for Second Ave. have been submitted to Board of Public Wks. by city engineer and referred to superintendent of streets for investigation and report. Proposed sewer is designed to carry off 75 per cent. of rainfall, amounting to 1 inch per hour, and is estimated to cost \$95,000.

CONTRACTS AWARDED.

Hammond, Ind.—For constructing deep main sewer system and pumping station by Board of Public Works, to United Construction Co., Hammond, at \$689,795. Other bids were: Thomas Lavene, \$782,633; Nash Dowdle, \$726,871; G. F. Proudfoot, \$716,907. Peter J. Lyons is City Engr.

Middletown, Ind.—For constructing 2.61 miles of vitrified pipe sewers to the Minnich Construction Co., New Castle, at \$15,235. M. H. Downey is Engr.

Gardner, Mass.—For constructing trunk sewer in Parker St. by Sewer Commission to W. B. Byrne, West Medford. Estimated cost is \$13,000.

Duluth, Minn.—Contract for construction of sanitary sewer in Sixth St., between Atlantic and Michigan Aves., has been awarded to Norquist & Berg on their bid of \$3,671.80. Sanitary sewer was ordered constructed in Wicklow St. from 38th to 39th Ave. west and in 39th Ave. to Fifth St. Estimated cost is \$1,223.92.

Atkinson, Neb.—To M. A. Camery, of Harlan, Ia., at \$13,800, for installation of proposed sewer system.

Albany, N. Y.—To Henry C. Ulen, 38 S. Dearborn, Chicago, Ill., at \$356,057 for construction of intercepting sewer system by Board of Contract and Supply. All bids on sewage disposal plant were rejected. F. R. Lanagan is City Engineer.

Albany, N. Y.—For constructing intercepting sewer by Board of Contract and Supply to Henry Cullen, Chicago, Ill., at \$365,656. Other bids were from: McCarthy & O'Heron, Pittsburgh, Pa. (a), monolithic concrete pipe, \$424,218; (b) reinforced concrete pipe, \$437,409. J. L. Sigretto & Co., Woodhaven, L. I. (a), \$366,387; (b) \$371,695.

Holley, N. Y.—By Bd. Village Trus., for 6½ miles pipe sewers, to F. S. & A. Sporato, Syracuse, at \$39,073 and disposal works to Fots & Craib, Rochester, at \$9,700. Bids were as follows: (a) pipe sewers; (b) disposal works: A. J. Shaw, Jr., Batavia, (a) \$40,785; Frontier Contrs. Co., Buffalo, (a) \$41,764; John Petrossi Co., Rochester, (a) \$43,034; Northern Eng. & Contr. Co., Saranac Lake, (a) \$44,122; (b) \$10,039; Brooks & Julian, Rochester, (a) \$45,220; (b) \$11,980; Thos. Holohan, Rochester, (a) \$47,953; (b) \$10,247; Drake & Dean, Inc., Buffalo, (b) \$10,957; W. A. Lofler, Rochester, (b) \$11,168.

Niskayuna, N. Y.—By Sewer Commission contract for constructing about 14,000 lin. ft. sewers in New Boulevard Section to John Allen, at \$11,571, Buffalo, N. Y.

Syracuse, N. Y.—To John Young, at \$3,051, for construction of storm water sewer in Court St., from Michaels Ave. to Seventh North St.

Watertown, N. Y.—John Duffy was low bidder on contract for construction of a sewer from Pearl St. about 200 ft. westerly in East Moulton St. Mr. Duffy's bid totaled \$644.40. William O'Neil bid \$940.50 and Gooley & Allard bid \$1,156.50.

Cincinnati, O.—For sewerage right of way from Prentice St. to Ebersole Ave., etc., to Connelly Constr. Co., of Wichita, Kan., at \$74,606.

Portland, Ore.—Commissioner Dieck has recommended that contract for construction of Rhine St. branch of Brooklyn district sewer be awarded to William Lind, of Portland, for \$108,599. This proposal was \$10,000 less than next lowest bid. Vitrified sewer pipe will be used in construction of drain.

Woonsocket, R. I.—To G. T. Austin, of Providence, contract for building surface water drain in North Main and Prospect Sts. F. H. Mills is City Engineer.

Mitchell, S. D.—For lateral sewers in Sewer Dist. 2, to Wm. Fitch Co., Omaha, Neb., at \$4,078. Thos. Eastcott is City Auditor.

Sisterville, W. Va.—For paving with brick Chelsea, Urban and Rexford Sts. and 5th Ave., approximately 7,500 sq. yds. pavement and 5,250 lin. ft. concrete curb to Chaddiodon & Bradley, Sistersville. A. T. Holmes is City Clerk.

Seattle, Wash.—For construction of sewers in 14th Ave., N. D., to L. Colccio at \$10,091.27.

Ashland, Wis.—By Bd. Pub. Wks. for constructing sewers at \$15,000 to John Sandstrom.

Reedsburg, Wis.—For constructing lateral sewer in Booster Boulevard to William Miller, Reedsburg. William H. Dierken is City Clk.

Esquimalt, B. C.—To Agnew & Young, Victoria, for constructing second unit of local sewer system at \$82,000.

WATER SUPPLY

Sacramento, Cal.—Pursuant to request by Norman E. Williamson, City Health Officer, that dry chlorine gas apparatus be installed near intake of City Waterworks for purpose of killing germs of various kinds, City Commission has authorized City Engineer Albert Givan to prepare plans for such apparatus with estimate of cost.

Glenwood Springs, Colo.—By vote of approximately 5 to 1 taxpayers of this city have voted to purchase plant of local water company. City also voted to issue \$110,000 in bonds with which to pay for plant. City will assume charge of plant July 1. Decision to take over plant marks culmination of controversy of fifteen years' duration over the question of municipal ownership of water plant.

Wilmington, Del.—Chief Engineer Edgar M. Hoopes, Jr., of Water Department, has decided to go ahead with work of installing new water main, at foot of Orange St.

Daytona Beach, Fla.—Town is planning to install water works this summer and will shortly advertise for bids. Stephen Smith is Councilman.

Columbus, Ga.—City of Columbus has sold \$450,000 water works bonds at 104.98 with accrued interest from July 1 to date of delivery to Kean & Taylor Co., New York City.

Rome, Ga.—Estimates will be furnished by superintendent of pub. works, to water committee of council, as to cost of extending intake pipe for pumping station, 200 yards up Oostanaula river. Intake pipe is new below mouth of Dry Creek, and it is believed that purity of water supply will be preserved by change of intake pipe.

Sterling, Ill.—Committee on Fire and Water has reported estimate of cost of contemplated enlargement and extension of city waterworks system, estimate being \$8,281.

Baltimore, Md.—The Public Service Commission has approved plans of the Brooklyn and Curtis Bay Light & Water Co. for extending its water service to town of Brooklyn, Anne Arundel County.

Holyoke, Mass.—Considerable extension of water main system of city has been ordered at Water Board which will greatly improve system in lower section of city.

Asbury Park, N. J.—Citizens have approved by vote of 177 to 73, a \$50,000 water bond issue and at same time authorized first step in development program of city water system by providing funds for 24-in. forcing main from pumping station to Second Ave. reservoir.

New Brunswick, N. J.—As one of preliminaries to construction of standpipe in this city, Board of Water Commissioners will prepare new contract to be submitted to Highland Park, which now buys its water from New Brunswick under ten-year contract, running from April 1, 1908. It is expected that present contract will be terminated and new one take its place.

New Paltz, N. Y.—The \$1,000 bond issue of village of New Paltz for improvement of waterworks system has been awarded to Adams & Co., of New York, at 100.51. Next highest bid was New Paltz Savings Bank at 100.28.

Niagara Falls, N. Y.—Water Board has been given permission to sell \$65,000 worth of 4% per cent. bonds for new mains.

Niagara Falls, N. Y.—Bids will be received by Board of Estimate and Apportionment up to 10 a. m., June 19, for purchase of water bonds in sum of \$65,000. Thos. H. Hogan is City Clerk.

Oswego, N. Y.—Department of Water will this year expend about \$12,000 on main extensions in various parts of city, and to rush work and get everything under way as soon as possible, contracts for pipe, materials, valves and hydrants, totaling in value about \$7,000, have been awarded.

Bids for pipe and specials have not been extended to total cost, but Rensselaer Valve Company received contract for valves and hydrants for the West Bridge street main enlargement, and Eddy Valve Company on general five thousand dollar extension under charter. Rensselaer company was also low for hydrants and valves for Oak Hill extension. All pipe contracts went to the Donaldson Iron Company of Emaus, Pa., at their bid of \$21.15 per ton for pipe and .02% per pound for specials shipped with pipe.

Potsdam, N. Y.—Four streets will be equipped with water mains this year, according to announcement to water users published by Water Board. Approximately 5,500 ft. of water mains will be laid. Streets to be improved are: Clinton St., entire length; Depot St., entire length; Leroy St., one block from Broad to Elm Sts.; Lawrence Ave., one block from Chestnut St. to Clinton St.

Coshocton, O.—R. M. Temple, former member of board of public service, has recommended extension of 18-in. water main up Locust Street to east end of city; construction of new 14-in. main clear across eastern and southeastern section of city, and construction of new storage reservoir with capacity of not less than 3,000,000 gallons, and installation of water system.

Allentown, Pa.—Bids for bonds will be received by Wm. H. Hoffman, Burgess, at his office, No. 300 Main St., Borough of South Allentown, until 5 p. m., June 22, A. D. 1914, and publicly opened on same day by Borough Council, for purchase of whole or any part of forty-three thousand bond issue of Borough of South Allentown, Pa. Sum of thirty-five hundred dollars for payment of present floating indebtedness of Borough; and sum of thirty-nine thousand, five hun-

dred dollars for installation of water plant and waterworks, pumping station and machinery, standpipe or pipes and extension of mains and pipes, and securing of supply of water for public and private use.

Walterboro, S. C.—Town Council has set Tuesday, July 7, as date for elections upon questions of issuing bonds for \$18,000 to install new waterworks system, and \$12,000 for sewerage system.

Huron, S. D.—Notice is given that on Tuesday, the 23rd day of June, A. D. 1914, special election will be held in city of Huron at which there will be submitted to vote of electors question of issuing bonds of said city in sum of Twenty-Two Thousand (\$22,000) Dollars, for purpose of securing site, constructing, installing and equipping mechanical gravity filter plant and increasing water supply of said city, all as part of the public waterworks system of said city for purpose of providing pure water for domestic use. D. G. Medberg is Mayor.

Knoxville, Tenn.—Erection of standpipe is being considered.

Denison, Tex.—Bonds in sum of \$30,000 have been voted for filtering plant to be established at Randall Lake.

Beaumont, Tex.—All bids for construction of waterworks and intake for new filtration plant, settling basin and other improvements of waterworks plant have been rejected by city council and board of public works instructed to proceed with work under direction of special engineer employed some time ago to supervise betterments.

Brenham, Tex.—See "Sewage."

Seattle, Wash.—Councilman Erickson has introduced ordinance appropriating \$100,000 to be used in construction of new 6-ft. pipe line from new masonry dam in Cedar River down to power house.

CONTRACTS AWARDED.

Upland, Cal.—By Mountain View Water Co., of Upland, to Henry Klusman, for 12,000 ft. of cement water pipe.

New Castle, Ind.—Contract for erection of water tower at Indiana Village for Epileptics has been awarded to Howard C. Elliott and Frank Boyer, at meeting of trustees of the village. Bid of successful parties was \$6,290.

Bloomington, Ill.—Frank Sullivan was low bidder on proposed Hannah St. water main from Clay to Croxton Ave. Estimate of city engineer on this improvement amounted to \$1,880.65, but all of bids were under that figure. Bid of Frank Sullivan was \$1,700.27; D. H. Rider, \$1,703.61; J. A. Lederer, \$1,718.03; P. F. McDonald, \$1,733.18; Ross Johnson Co., \$1,845.81.

Wellesley, Mass.—By Water and Municipal Light Comrs., for one 2,000,000-gal. vertical double-acting triplex pump to Goulds Mfg. Co., Seneca Falls, N. Y., at \$4,705.

Havre, Mont.—For laying water main in special Improvement Dist. 53, to P. H. Brader, Havre, at \$4,896.

North Loup, Neb.—To Alamo Engine & Supply Co., of Omaha, at \$16,553, for installation of water and light system, and to E. C. Archibald, of Council Bluffs, Ia., for drilling well, furnishing and installing pump for \$1,025.

Perth Amboy, N. J.—For furnishing and laying 13,000 ft. of 30-in. cast iron main from Runyon water works to standpipe at Ernston to Ira R. Crouse at \$5.09 per ft.

Arkport, N. Y.—By Village Board of Trustees for constructing water system to Fischette Bros., Clyde, N. Y., at \$14,370. Other bids as follows: Empire Contract Malar & Equipment Co., Inc., \$15,325; William H. Madden, \$16,205; Prentiss & Dunton, \$16,765, and Witt & Blades, \$20,506. R. D. Halsey is Village Clerk.

Schenectady, N. Y.—The Ludlow Valve Co., Rensselaer Valve Co., and Eddy Valve Co., all of Troy, were bidders for six 24-in. gates and two 36-in. gates needed by bureau of water, first firm getting contract, its bid being \$1,735. For supplies and fittings for the bureau of water several bids were opened as follows: Charles Miller & Sons, Utica; R. D. Wood & Co., Philadelphia; U. S. Cast Iron Pipe Co., Donaldson Iron Co., the last not accepted because of failure to accompany bids with certified check; and Standard C. T. P. Co., of New York, which got contract, amounting to \$1,643.55.

Troy, N. Y.—For about 28,500 ft. 30-in. c. i. pipe from Air Valve No. 6 Chippey's Woods Oil Mill Hill to Tomhannock Tunnel, to include setting valves, special castings, etc., to H. K. Corbin Co., 170 Bway., New York, at \$73,485. Other bids:

W. H. Golden Co., Troy, \$76,842; A. M. Harper Co., Newburg, \$81,466. A. E. Roche is City Engr.

Springfield, O.—Bids on 100 tons of cast iron pipe were as follows: R. D. Wood & Co., Philadelphia, \$23.10 per ton; American Cast Iron Pipe Co., Birmingham, Ala., \$22.85 per ton; special castings, \$55 per ton; United States Cast Iron Pipe Co., of Cincinnati, \$23.45; Donaldson Iron Co., \$23.80, no check; Glamorgan Pipe & Fdry. Co., of Lynchburg, Va., \$22.75 per ton. Contracts for above will shortly be let.

Elgin, Ore.—To Leo Morelock for constructing of gravity water pipe line for municipal water system.

Lafayette, Ore.—Water bonds in sum of \$15,000 have been sold to Fred L. Glenn Co., of Portland, and contract has been awarded to G. T. Morgan, of Portland.

Umatilla, Ore.—To W. G. Mulligan, Spokane, at \$20,043, for constructing water works. Louis C. Kelsey is Engr., Selling Bldg., Portland.

Ashland, Pa.—For improving the water system, about 10,000 cu. yds. of excavation, to Andrew H. Haig Co., Philadelphia, Pa., at \$0.71 per cu. yd. J. William Ritz is Town Clk.

Sankertown, Pa.—By Borough Secretary for laying water pipe to Baker-Owens Construction Co., Johnstown, Pa., at \$6,960. Other bids as follows: E. H. Hess, \$7,447; W. W. Soupp, \$7,567, and Loomis & King, \$8,586. D. W. Dillman, Altoona, is Engr.

Ogden, Utah.—On recommendation of Mayor A. G. Fell, city board of commissioners has granted petition for extension of water mains 250 feet on Seventh St.

Aberdeen, Wash.—For furnishing 5 tons of pig lead by Peter F. Clark, City Clk., to Crane Co., Seattle, at \$4.55 net per 100 lb. L. D. Kelsey is City Engr.

Antigo, Wis.—Residents of this city will vote on June 16 on question of purchasing property of Antigo Water company for \$145,666.

Colfax, Wis.—To J. M. Donahue, of Stevens Point, Wis., at \$13,066, for installation of water works system, consisting of 40,000-gal. steel tank and tower 100 ft. high, 10-in. well 100 ft. deep, 150-gal. per minute pump, 15 h.p. oil engine, 6,700 ft. of pipe laid 8 ft. deep, pump house of sandstone.

Niagara Falls, Ont., Can.—Stamford Council has accepted bid of Stewart & Lloyd Co., Limited, of Glasgow, Scotland, for steel pipe for proposed new waterworks system. Company's bid was 23½ cts. per ft. for 4-in. pipe; 36 cts. for 6-in. pipe; 61 cts. for 8-in. pipe, and 86 cts. per ft. for 10-in. pipe.

BIDS RECEIVED.

Beverly, Mass.—Bids have been opened by Deputy Commissioner of Public Works for cast-iron pipe, hydrants, valves, gates, special castings and pig lead. There were six bidders on pipe as follows: Cast-iron pipe, 500 ft. of 12-in. weight approximately 985 per 12 ft. length and 2,100 ft. 18-in. pipe, weight approximately 1,788 lbs., United States Cast Iron Pipe Foundry Co., Philadelphia, \$21.30 per 2,000 lbs. f. o. b. at Beverly; Donaldson Iron Co., Emaus, Pa., \$21.60 per 2,000 lbs. f. o. b. at Beverly, in carload lots; Warren Foundry & Machine Co., New York, \$21.25 per 2,000 lbs., with a cash discount of 25 cts. per ton in 30 days; Standard Cast Iron Pipe & Foundry Co., Bristol, Pa., 12-in., \$22.70 per 2,000 lbs. net, 18-in. \$22.20 net f. o. b. at Beverly; R. D. Wood & Co., Philadelphia, \$21 per 2,000 lbs. f. o. b. at Beverly, \$20.40 free of wharfage; Charles Miller & Sons, Utica, N. Y., \$23.20 per 2,000 lbs. f. o. b. at Beverly. Hydrants—Chapman Valve Co., Boston, hydrants as specified with one steamer connection, \$35; with two steamer connections, \$37 each; R. D. Wood & Co., with one steamer connection, \$20.30; two connections, \$24.55; Kennedy Valve Co., \$27 each. Gates—Kennedy Valve Co., 6-in., \$8 each; 8-in., \$13 each; 18-in., \$72 each. Coffin Valve Co., 6-in., \$7.65; 8-in., \$11.75; 18-in., \$70. Chapman Valve Co., 6-in., \$8.50; 8-in., \$14; 18-in., \$80. Pig lead—Richardson Co., Boston, 4 17-100 cts. per lb. There was but one bid for special castings, from the Builders Iron Foundry Co., of Providence, R. I., the bids running in price from \$12.38 each to \$28.50, according to size and weight.

Eugene, Ore.—Following are bids received for laying new water mains, consisting of 2,200 ft. of 12-in.; 6,800 ft. of 10-in.; 12,200 ft. of 8-in., and about 450 ft. of 6-in. Mains:

J. F. Shea, of Portland, \$7,702 for cast iron; no bid on steel.

J. L. Calvert, of Eugene, cast iron, \$9,260; steel, \$9,080.

Barney & Johnson, of Portland, cast iron; no bid on steel.

James Kennedy Construction Company, of Portland, cast iron, \$4,968; steel, \$4,320.

Appling, Griggs & Co., Tacoma, cast iron, \$18,604; steel, \$19,275.

Stein Bros., of Eugene, cast iron, \$5,494; steel, \$5,494.

Charles Mahany, of Eugene, cast iron, \$10,800; steel, \$9,936.

Hall & Soleim, of Eugene, cast iron, \$9,882; steel, \$7,935.

J. Erickson, of Seattle, cast iron, \$7,021.50; steel, \$6,873.50.

Collier & Stevenson, of Eugene, cast iron, \$6,274; steel, \$5,638.

E. J. Cantine, of Portland, cast iron, \$11,550.

Elliott Contracting Company, of Portland, cast iron, \$7,316; steel, \$7,316.

Soleim & Aageson, of Eugene, and Springfield, cast iron, \$5,708; steel, \$5,980.

LIGHTING AND POWER

Glenwood Springs, Colo.—By majority of five to one, this city voted to purchase Glenwood Light & Water Co. Issuance of \$110,000 in bonds was authorized. Plant will be taken over July 1.

Loveland, Colo.—Loveland citizens have decided that city should own and build municipal electric light plant. It is estimated that plant will cost about \$1,000,000 and that light that city used on streets will pay 4 per cent. on investment.

Apopka, Fla.—Election has been called to vote on \$9,000 for lights.

Marblehead, Mass.—Question of installing "white way" along Fort Beach is being considered.

Pittsfield, Mass.—City committee on fuel and street lights has voted to recommend to City Council installation of 51 luminous arc lamps, 7 incandescent arc lamps and 110 bug lights.

Williamansett, Mass.—Work of drawing up plans for new system of lighting in progress. A row of clustered lights, 10 in each set, will be placed around City Hall.

Flint, Mich.—Plans for electric conduits to be constructed before new pavement is laid on Saginaw St., as prepared by Electrical Inspector Hanna, have been approved by Common Council. Conduits are meant to take care of electrical equipment of fire and police departments, but will also provide room for laying of wires to feed proposed boulevard lighting system. City clerk has been instructed to advertise for bids for laying of conduits to be received until June 22.

Duluth, Minn.—Council has approved applications for water and gas extensions in new addition between 16th and 19th Aves. east and Seventh and Tenth Sts. Estimated cost is \$10,000.

Fort Benton, Mont.—Petition having been circulated and presented to council asking that sewer construction be delayed until after acquisition of lighting plant, resulted in passing of ordinance providing for sale of about \$17,000 in bonds for purchase of a plant.

Livingston, Mont.—City Council is discussing installation of ornamental street-lighting system and fire-alarm system.

Orleans, Neb.—Circulation of petition has been started asking for special election to vote bonds to amount of \$12,500 to purchase electric light plant now owned and operated by company of local business men. City owns its water plant and system, but hires pumps run by electric power.

Butler, N. J.—Election will shortly be called to vote on question of bond issue of \$30,000 for installation of a municipal electric light plant.

Long Branch, N. J.—The Ocean Township Committee will soon install lights throughout township to take place of present arc lights. There will be 65 lights in all.

Albany, N. Y.—Public service commission has given its approval to plans for lighting village of Luzerne with electricity, generated by water power station at outlet of Lake Luzerne.

Brooklyn, N. Y.—Commissioner of Water Supply, Gas and Electricity Williams has made new contract with New York Edison Lighting Co., whereby new "nitrogen lamps" to be introduced will increase efficiency of street and park and public buildings lighting of city over 50 per cent. Present incandescent street lamps furnish 60-candle power with 80 watts of electricity and new lamps furnish 100 candle power with same amount of electric current. There are upward of 18,000 street lamps in Queens, of which 2,000 are electric arc lamps, 8,000

electric incandescent and 8,000 mantle gas lamps. All of electric lamps will be changed within present year to new nitrogen style.

Schenectady, N. Y.—The Public Service Commission has given its approval to plans for lighting village of Luzerne with electricity, generated by water power station at outlet of Lake Luzerne. Site for generating station, contract for lighting village, and franchises for necessary construction already owned by Myron B. Riddell are authorized to be transferred by him to Riddell Electric Light Company, Inc., which he organized for this purpose.

Youngstown, Ohio.—H. Whitford Jones, Citizens' Bldg., Cleveland, Ohio, will prepare plans for municipal electric-light plant and new street-lighting system.

Ada, Ok.—Special election has been called for June 30 to vote on question of granting franchise to Macchwaite Oil and Gas Company to supply natural gas to this city. Several other oil companies are expected to submit like bids. Gas will be obtained from fields near Ada.

Williamsport, Pa.—Bids for lighting streets of city have been received. The Lycoming-Edison Co., the Citizens' Electric Co. and Northern Central Gas Co. were bidders. The present contract expires December 1, 1914.

North Smithfield, R. I.—Sum of \$2,350 has been appropriated to authorize Town Council to make contract with Blackstone Valley Gas and Electric Company for lighting of streets.

Parker, S. D.—Oscar Claussen Engineering Co., 314 Commercial Bldg., St. Paul, Minn., is preparing plans for municipal electric-lighting system to cost about \$27,000.

Nashville, Tenn.—Bills has been approved appropriating \$573 for purchase of cable for lighting department.

Terrell, Tex.—Move is on foot to sell city light plant in this city. City Commission is considering matter of submitting proposed sale to vote of people if sale is made proceeds will be used for enlarging water supply of city.

CONTRACTS AWARDED.

Covina, Cal.—To Newberry-Bendheim Electric Co., Stimson Bldg., Los Angeles, at \$11,948, for installing cluster lighting system.

Sterling, Ill.—By Board of Local Improvements contract for new curb lighting posts to Sterling Foundry Co., at \$15.75 per post, with Holophane Co.'s acorn shape top, priced at \$6.75, making total cost per post \$22.50.

Indianapolis, Ind.—City Council, by unanimous vote, has ratified contract with Merchants Heat & Light Co. for electric street lighting for ten years, beginning April 1, 1915. The Merchants company expects immediately to prepare for taking over street lighting business next April and will spend several hundred thousand of dollars in getting ready. Under new contract city will pay following rates: Arc lights, \$41.98 a light a year; 100-watt Tungsten on ornamental post, \$27.71 a light a year; three-light Tungsten clusters on ornamental post, \$40.35 a cluster a year; five-light Tungsten cluster on ornamental post, \$45.18 a cluster a year; 100-watt Tungsten on wood post, \$17.33 a light a year; 100-watt Tungsten, to be used as top light on present five-light cluster standards maintained by business men in downtown district, \$8.92 a light a year; current for light and power for municipal building, .0195 cts. a kilowatt hour.

Wellsville, Kan.—To Bushong Electrical Works for constructing city electric light and ice plant. Cost \$7,000.

Virginia, Minn.—For lighting system for Olcott Park and South Park, to J. S. Swanson, Virginia, at \$2,456.

Helena, Mont.—By City Council contract for furnishing 400 lighting posts for West Side ornamental lighting system to Caird Engineering Co., at \$6,320.

Passaic, N. J.—Resolution has been passed by Board of Commissioners of Township of Union authorizing execution of contracts for street lighting with Public Service Corporation.

Niagara Falls, N. Y.—By Board of Public Works contract for lighting city for period of five years, to Buffalo & Niagara Falls Electric Light & Power Co. Present arc lamps will be replaced by magnetite arc lamps.

Abingdon, Va.—At meeting of Abingdon city council bids for furnishing Abingdon day and night current have been opened, and thirty-three-year franchise granted Abingdon Light and Water Company as successful bidders over Watauga Light and Power Company, of Tennessee.

Union Grove, Wis.—For construction of new electric light plant to Globe El. Co., of Milwaukee.

FIRE EQUIPMENT

Indianapolis, Ind.—Board of Public Safety is advertising for bids for 2,000 feet of hose.

Pittsfield, Mass.—Committee has voted to have order introduced in City Council for appropriation of \$500 for repairs on fire-alarm system, number of boxes having been burned out last fall.

Woburn, Mass.—Petition presented by number of prominent citizens calling for motorization of entire department is being considered by Council, apparatus to consist of triple combination wagon, ladder truck, combination chemical and hose wagon, and tractor for engine.

Duluth, Minn.—Commissioner W. H. Hicken, head of safety division, is contemplating entirely motorizing West Duluth fire station and installing automobile for use of West Duluth police department.

Duluth, Minn.—City Council has decided to purchase new motor aerial truck for fire department to cost \$10,000 to \$12,000.

Kalispe, Mont.—City Clerk will advertise for bids for motor apparatus. P. R. Neilson is Chief.

Gallup, N. M.—Appropriation of \$20,000 is said to be authorized for purchase of new apparatus.

Hoboken, N. J.—Board of Fire Commissioners may shortly advertise for bids for two tractors. Michael A. Dunn is Chief.

Morristown, N. J.—At regular monthly meeting of Common Council fire committee was authorized to investigate advisability of motor propelled hook and ladder fire apparatus.

Canandaigua, N. Y.—Common Council has authorized Department of Health and Public Safety to expend \$4,000 in purchasing motor chemical fire truck to take place of horse-drawn apparatus now used by Merrill Company.

Schenectady, N. Y.—Bids will be received until 11 a. m., June 23, for purchase of \$26,000 fire bonds. J. F. Hooker is City Comptroller.

New Bern, N. C.—Thomas Lassiter, Chief of New Bern Fire Department, has asked Board to authorize purchase of 2,000 ft. of hose. Alderman Ellis moved that city clerk be instructed to advertise for bids for this amount of hose in local newspapers. Purchase of combination, high power fire engine is also being considered.

Cincinnati, O.—Following bond ordinances will be voted upon July 14: Four new fire stations, \$54,000; ten motor combination chemical and hose wagons, \$50,000; two 85 ft. aerial trucks, \$25,000; one motor pumping engine, \$9,000; one service ladder truck, \$9,000; two chiefs' cars, \$5,000; tractors for four engines and three ladder trucks, \$31,500; hose, \$10,000; fire hydrants, \$6,000; alarm boxes, \$15,000; wire and additional alarm equipment, \$3,000. J. C. Bunker is Chief.

Girard, O.—Proposed plans for new fire station at Girard have been gone over by council. Council hopes to dispose of various preliminary details and award contract for improvement within a few weeks. They are also considering purchase of considerable new equipment.

Freeland, Pa.—Fire committee of council has recommended purchase of 500 feet of hose, a dozen rubber coats, a new brake for ladder truck, four lanterns and two nozzles.

Kittanning, Pa.—Purchase of new hose is being urged.

Providence, R. I.—Board of Fire Commissioners have strongly recommended new fire alarm system.

Norfolk, Va.—Bids for two 6-cylinder 2-wheel front drive motor tractors, to be attached to the apparatus now in fire department have been opened by Board of Control. No contract was awarded, controllers referring estimates to R. F. McLaughlin, chief of the department, for recommendation. Bids and bidders are: Nott Fire Engine Co., \$4,000 each; Front Drive Motor Co., \$3,000; C. J. Cross, Front Drive Tractor Co., \$3,475 and \$3,300; American-La France Fire Engine Co., \$4,500 and \$5,000.

CONTRACTS AWARDED.

Phoenix, Ariz.—By city for 25 additional fire alarm boxes, 2 house registers and two copper bells to Star Electric Co., of Binghamton, N. Y.

Beverly, Mass.—Contracts for supplying of city fire department with 1,500 ft. of hose have been awarded by Public Service Committee to Globe Rubber Co., of Boston, for 74 cts. a foot. Hose is to be double knit.

Brookton, Mass.—To American & British Mfg. Co., Providence, R. I., contract for tractor to be attached to second size steamer, at \$4,250.

New Bedford, Mass.—Contract has been awarded for 2,000 ft. of fire hose to C. C. Co. at 62½ cts. a ft.

Schenectady, N. Y.—Contract for combination auto truck for Hose House No. 9 has been awarded to American La-France Fire Engine Company of Elmira, New York, by board of contract and supply.

Toledo, O.—To American-La France Fire Engine Co. of Elmira, contract for motor aerial truck, at \$10,650.

Williamsport, Pa.—To American-La France Co. of Elmira, N. Y., contract for triple combination automobile pumping truck.

BRIDGES

Sacramento, Cal.—Supervisors of Yolo County have decided to construct a \$45,000 concrete bridge across Cache Creek north of Esparto. This county will also pay half cost for bridge across Putah Creek east of Winters, and will build another structure across Cache Creek near Yolo. Supervisors of Sutter County have adopted plans and specifications for construction of new bridge over Butte Slough. It will cost \$60,000 and will be of reinforced concrete.

Sacramento, Cal.—Bids have been opened by California Highway Commission for construction of 3-mile concrete trestle over Yolo basin, which, when completed, will be longest of its kind in United States. Trestle will connect Sacramento with San Francisco by direct road. Structure, according to specifications of contract, must be built in 300 working days. Six firms bid on project, which State Highway Engineer estimates will cost \$363,800, including material to be used. The Van Sant Houghton Co., of San Francisco, submitted the lowest bid, \$250,415. Snare & Triest, of New York, were the highest bidders, with an offer of \$387,340. The State will furnish the material.

Yuba City, Cal.—Plans and specifications for new Butte Slough bridge to replace one destroyed by fire have been accepted by Supervisors. Estimated cost is \$60,000. It will be girder structure of reinforced concrete. Bids will be advertised for at once.

Huntington, Ind.—County commissioners have been making preparations to order three bridges built on Beck extension road in Wayne township.

Indianapolis, Ind.—Bond issue of \$300,000 has been authorized by Council for West Washington St. bridge.

Freehold, N. J.—Plans and specifications prepared by County Engineer George D. Cooper for bridge over Deal Lake flume at Asbury Park, have been approved by Board of Freeholders and clerk directed to send plans to state road commissioner for his approval.

New York City, N. Y.—Park Commissioner Ward has asked Board of Estimate for \$25,000 for reconstruction of historic Bow Bridge, which spans Central Park Lake from south end of the Ramble to lawns between Terrace Bridge and the Webster Monument. Board appropriated \$25,000 for reconstruction in 1910, but Municipal Art Commission objected to bridge reconstructed of cement, and authorization was rescinded.

Schenectady, N. Y.—Bids will be received until 11 a. m., June 23, for purchase of \$1,500 bridge bonds. J. F. Hooker is City Comptroller.

Eugene, Ore.—County commissioners' court has decided to erect concrete bridge across ditch near High Bank, on Eugene-McKenzie road this summer.

Portland, Ore.—Bids for construction of new Sandy River Bridge will be advertised for in few days. According to plans and specifications filed with County Commissioners bridge is to be of two spans, one 200 ft. and the other 77 ft. long. Bids received few days ago were rejected because Commissioners had not followed the law.

Altoona, Pa.—Blair County Commissioners will proceed with much delayed work of building proposed new county bridges. Ten bridges now authorized are as follows: Over Stoner's run, Shoenberger, Tyrone Township; Arch Spring run, Espey farm; Roaring run, Mount Etna, Catharine Township; Poplar run, Catfish road, Blair Township; Mill Run, Allegheny Furnace, Logan Township; Little Juniata, Logan school house, Logan Township; Wooster's run, Snyder Township; Canoe Creek, Bragshaw's farm, Frankstown Township; Clover Creek, Brumbaugh's Mills, North Woodbury Township, and Dry run, Martinsburg.

Philadelphia, Pa.—Three bridges for

which plans are ready for submission of specifications of bidders have been sent to Public Service Commission by Chief Webster, of Survey Bureau, for approval. These bridges cross railroads and must have approval of the Commission. One is to cross tracks of the Baltimore Central Railroad at Seventy-first St. It will be constructed of steel and concrete, and cost \$40,000. Others are foot bridges, costing \$10,000 each, on the line of Warrington Ave., over the West Chester Railroad, and other on the line of Reed St., over B. & O. tracks. Money is available for all three.

Reading, Pa.—A reinforced concrete bridge, to cross Schuylkill River, Schuylkill Canal and railroad tracks at foot of Bingham St., Reading, is next projected.

Cumberland, R. I.—Taxpayers have voted to expend sum of \$20,000 for town's proportion of expense of bridge at Valley Falls.

CONTRACTS AWARDED.

Redding, Cal.—For constructing concrete bridge over Sacramento River at Reids Ferry, to Chico Constr. Co., Sacramento, at \$49,650.

Cottonwood Falls, Kan.—By Commissioners of Chase County contract for construction of reinforced concrete bridge across Cottonwood River at Cottonwood Falls to Missouri Valley Bridge & Iron Co., Leavenworth, Kan., at \$13,700. Other bidders were: The Kansas City Bridge Co., \$16,650; P. J. Norton, \$19,000 for a stone arch or \$23,350 for a reinforced concrete structure. W. B. Penny is County Clk.

Dedham, Mass.—By Bd. Selectmen, for constructing Mill Lane bridge and its approaches, to Hancock Eng. Co., Boston, \$15,957. Other bidders: Rendle & Stoddard, Boston, \$16,254; Hyde Park Constr. Co., Hyde Park, \$16,421; Thos. A. Cassidy, Fitchburg, \$16,789; Walter Smith & Son, Norwood, \$16,895.

Uxbridge, Mass.—For construction of reinforced concrete bridge in Uxbridge to Hancock Engineering Co., Boston, at \$3,061.

Westfield, Mass.—By Board of Selectmen contract for construction of reinforced concrete arch bridge to Simpson Bros., 166 Devonshire St., Boston, Mass., at \$11,864. Other bidders were: W. W. Salter, Holyoke, Mass., \$12,266; Rice Valentine Co., Springfield, Mass., \$12,800; E. N. & R. E. Spaulding, Suffield, Conn., \$13,200; J. D. Fuller, New York, N. Y., \$13,285; Frazer & Burchenal, 1 Madison Ave., New York, N. Y., \$14,500. J. L. Hyde is Town Engr.

Westfield, Mass.—By Bd. Selectmen for reinforced concrete arch bridge, to Simpson Bros., Boston, at (a) \$11,864. Bids were as follows: (a) broken stone; (b) gravel: T. J. Hynes & Sons, Providence, R. I., (a) \$16,788; W. R. E. Sawin, Springfield, (a) \$15,958; (b) \$14,733; H. C. Wood, Westfield, (a) \$15,113; D. O'Connell's Son, Holyoke, (a) \$16,999; (b) \$16,381; Rice, Valentine Co., Springfield, (a) \$12,800; (b) \$11,600; E. B. Roberts, Pittsfield, (a) \$16,565; E. N. & R. E. Spaulding, Suffield, Conn., (a) \$13,200; W. W. Salter, Holyoke, (a) \$12,366; (b) \$11,366; Way & Cellilli, Springfield, (a) \$27,500; John Cashman & Sons Co., Boston, (a) \$18,659; Watson Engineering Co., New York, N. Y., (a) \$15,290; (b) \$14,450; R. L. Whipple & Co., Worcester, (a) \$18,625; (b) \$17,875; Simpson Bros., Boston (a) \$11,864; John E. Palmer, Boston, (a) \$16,530; (b) \$15,850; Hancock Engineering Co., Boston, (a) \$14,873; (b) \$14,000; Randle & Stoddard, E. Boston, (a) \$24,500; Darzagli-Vought Co., New York, (a) \$17,987; J. D. Tuller, New York, (a) \$13,285; (b) \$12,175; Fred T. Ley & Co., Springfield, (a) \$18,400; Frazer-Burchenal, New York, (a) \$14,500.

Long Branch, N. J.—Contract to raise and improve bridge over Parker's Creek, near Little Silver station, has been awarded by Board of Freeholders to \$17,900. This also includes filling in ap Owen J. Melee, of this city, on his bid of proaches. Other bidders were: Joseph Finn, of Long Branch, \$18,991.12; M. L. Prentice, Ocean Grove, \$19,250.

Ridgway, Pa.—For constructing concrete arch girder bridge over Clarion River, Main St., by County Comrs., to Wm. Dickinson, Ridgway, at \$30,000.

Warwick, R. I.—Bids for new reinforced concrete bridge over Pawtuxet river at Natick, to be built by towns of Warwick and West Warwick, have been opened. Lowest bid was made by T. J. & J. M. Hynes of Springfield, Mass., which was \$10,204. Other bids follow: R. L. Whipple, Worcester, \$11,207; G. F. Austin, Providence, \$11,756; Hyde Park Construction Company, Boston, \$11,846;

T. F. Cullinan, Providence, \$12,016; John F. McCusker, Providence, \$12,816; McKinnon Construction Company, Providence, \$13,913.61. Figures include sum of \$1,916 for furnishing reinforced steel and engineering work by Luten Engineering Company of Springfield.

San Antonio, Tex.—Largest amount of work in any one batch, under bond issue of \$1,000,000, has been let by County Commissioners when contracts were awarded calling for construction of 19 bridges to cost \$121,830. Specifications demand modern concrete structures and time limit is set on each contract. Successful bidders and bridges to be constructed are as follows: Tom C. Nelson, north contract, total of \$15,350; low bridge on the Castroville Road, across the Leon Creek, \$4,063; five low bridges across the Leon Creek on the Fredericksburg Road as follows: No. 1, \$1,920; No. 2, \$2,223; No. 3, \$1,580; No. 4, \$2,358; No. 5, \$3,206; time, 150 days. Tom C. Nelson east contract, exclusive of two high bridges, total \$14,172; low bridge across the Salado Creek on the Austin Road, \$5,906; low bridge across the Salado Creek on the Seguin Road, \$2,642; low bridge across the Salado Creek on the St. Hedwig Road, \$2,117. Both branches of the Salado Creek on the New Sulphur Springs Road, No. 1, \$1,835; No. 2, \$1,672. Time, 150 days. Tom C. Nelson, high bridge on Gonzales Road across Salado, out of east contract, total \$15,604; time, 110 days, Topeka Bridge & Iron Co., Topeka, Kan., total \$57,904; high bridge across the Leon Creek on the Culebra Road, \$12,085; high bridge across the Leon Creek on the Pearsall Road, \$14,704; high bridge across the Medina River on the Pearsall Road, \$8,154; high bridge across the Leon Creek on the Sommerset Road, \$13,396; high bridge on the Medina River on the Sommerset Road, \$9,565. The same firm was also given the contract for the construction of the high bridge across the San Antonio River to cost \$13,600 and high bridge across the Losoya Creek on the Corpus Christi Road to cost \$5,200. The firm was given until February 1, 1915, in which to complete this work.

Chippewa Falls, Wis.—County Bridge Committee have opened bids for 23 bridges and total cost for all contracts amounts to approximately \$18,500. First bridges to be contracted for are trunk line road between this city and Stanley, all three bridges to be placed on line between towns of Delmar and Edson. W. C. Kiernan & Co., of Whitewater, Wis., received contracts for three at \$2,738. Ed Lynch was awarded contracts for three bridges in town of Cleveland, at \$2,320. The Wausau Iron Works, of Wausau, received contract for building one bridge in Arthur at \$242. One bridge in town of Sampson was let to Whitewater Bridge Co., for \$520. J. W. Vance Co., of Eau Claire, were awarded three bridges in town of Howard at \$1,483.50. Two bridges in town of Bloomer were awarded to Wausau Iron Works at \$858. Modern Steel Structural Co., of Waukesha, was awarded contract for four bridges in town of Holcombe, at \$3,600. Three bridges in town of Wheaton were let to Whitewater Bridge Co. for \$2,470. Town of Tilden, two bridges, to Wausau Iron Works at \$2,233. The committee opened bids for four bridges for Eagle Point, but one of bids was higher than county ought to pay and was rejected. They allowed contracts for other three at \$1,587 to Worden-Allen Co., of Milwaukee.

MISCELLANEOUS

San Francisco, Cal.—Board of State Harbor Commissioners has approved plans and specifications submitted by Chief Engineer Newman for superstructure on pier 39, foot of Stockton street. Plan calls for two-story, steel frame, concrete structure, 104 feet wide and 900 feet long. Board has also approved plans and specifications for construction of pier 37, foot of Kearny street. This is to be creosoted pile structure with reinforced concrete bulkhead wharf. Pier is to be 200 feet wide by 831 feet long on northerly side and 1,060 feet long on southerly side.

Jacksonville, Fla.—Commissioner Smoot has recommended use of metal street signs in place of present wooden ones.

Chicago, Ill.—Plans for comprehensive system of garbage disposal are contained in report of City Waste Commission submitted to City Council and referred to Finance Committee. Report carries with it recommendation for appropriation of about \$1,322,000 to be used in rehabilitation of present garbage disposal station